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RECENT KNOWLEDGE OF THE INCIDENCE AND CONTROL OF CEREBROSPINAL FEVER*

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Although cerebrospinal fever is a comparatively rare disease, as judged by the standard of many of the common infections, a considerable amount of literature concerning it has appeared during the last twenty years. It is impossible within the scope of the present paper to deal even briefly with all aspects of its control and treatment. Consequently certain subjects are surveyed fairly fully, but others are merely mentioned or are omitted entirely.

Epidemiology

The first classical description of the condition which we now recognize as cerebrospinal fever was given by Vieusseux of Geneva in 1805. There is reason to believe, however, that the disease had appeared at intervals during the preceding 300 years, and references are made in the early literature to outbreaks in Holland, France, and other parts of Europe. In 1661 Willis described a "new disease" in which the pathological features resembled those of cerebrospinal fever. Sydenham also described a "new fever" in 1685; in this cerebral symptoms often followed fever and catarrh, and purple spots were frequently seen on the skin. The history of the disease from 1805 onwards was very fully dealt with by Hirsch (1886), who divided the intervening years into four periods of epidemic prevalence, ending in 1886. To these Sir Humphry Rolleston added a fifth or modern period, starting in 1903 and continuing to the present day. Indeed, it does not seem likely that we are soon to pass out of this period. In the years 1908–10 the disease was epidemic in France, and in 1910 and 1911 large outbreaks were reported from the United States.

In severe epidemics a notable feature of acute cases has often been the presence of a characteristic haemorrhagic rash, made up of small petechiae or, in other cases, more widespread and purpuric. The incidence of rashes varies widely. In an account of an outbreak in 1806–7 North says that they were present in almost every case. During the Great War Sir Humphry Rolleston (1919) found that they occurred in 59 per cent. of cases, and in the same period Worster-Drought and Kennedy (1919) discovered them in 53 per cent. of their cases. In an outbreak of a severe nature reported by me (Underwood, 1932) a rash was seen in 32 per cent. of cases. On the other hand, Borovsky (1930) reported the incidence of rashes as occurring in only 6.7 per cent. of cases in Chicago. Despite their variability the rashes have given cerebrospinal fever its popular name—"spotted fever." As such it has spread among the public a dread which the high mortality in the past has done little to belie. During the last war "spotted fever" caused many deaths among the civilian and military populations of this and other countries. It was then regarded as a condition associated with the movement of populations and the crowding together of troops in billets. Nevertheless the cessation of hostilities did not lead to a practical extermination of the disease. In recent years epidemics have been widespread and severe in many parts of Europe, in India, and in tropical countries such as the Sudan and other parts of Northern Africa.

Mention should be made here of the supposed association of cerebrospinal fever with certain diseases, especially influenza and other epidemic diseases of the central nervous system. There is much to be said for the views of Hamer (1906, 1928) and of Crookshank (1922, 1930) that outbreaks of these conditions are due to a change in the "epidemic constitution" of the community. Hamer (1917) applied his theory specifically to cerebrospinal fever. For a discussion of certain aspects of the theory in its relation to some of the rare encephalitic complications of infectious fevers reference may be made to a paper by me (Underwood, 1935). It is possible that the present war and the epidemics of cerebrospinal fever may be followed by other epidemiological happenings of great interest.

Incidence in Great Britain

Cerebrospinal fever became notifiable in this country in 1912, and Table I shows the notifications and deaths

TABLE I.—*Cerebrospinal Fever in England and Wales: Cases and Deaths*

Year	Notifications	Deaths	Year	Notifications	Deaths
1913	305	232	1927	469	430
1914	315	396	1928	412	438
1915	2,566	2,203	1929	650	588
1916	1,306	1,368	1930	661	632
1917	1,465	1,651	1931	2,152	1,440
1918	798	926	1932	2,087	1,213
1919	848	694	1933	1,668	942
1920	583	533	1934	1,079	729
1921	411	416	1935	864	617
1922	344	360	1936	967	635
1923	300	284	1937	1,112	698
1924	397	310	1938	1,258	652
1925	402	354	1939	1,508	—
1926	384	365	1940* (first 13 weeks)	5,093	—

*From Weekly Returns of Registrar-General (corrected).

* A paper read before the Home Counties Branch of the Society of Medical Officers of Health.

from 1913 to the present day. The data given are those published officially by the Registrar-General. It should be noted that in many years the deaths exceeded the notifications. This is a caustic commentary on deficiencies in diagnosis and on the non-notification of cases as soon as the diagnosis was established. The deaths for the year 1939 are not yet available officially. The figure 5,093 for notifications for the first thirteen weeks of 1940 is the sum of the corrected notifications given weekly by the Registrar-General for the country as a whole. The notification figures for counties and for administrative areas given in Table II and discussed in the text are uncorrected figures from the Registrar-General's weekly returns.

Cerebrospinal fever first gained notoriety by its prevalence in 1915. In this outbreak the disease was supposed to have been introduced into this country by Canadian troops who were overcrowded on troopships. In Table I the figures include only civilian cases. Some idea of the real extent of the outbreak in that and the following years may be obtained from the statement that while, as the table shows, 6,450 civilian cases occurred in the years 1914–18, during the same period in England and Wales 3,915 Service cases were notified, and that, in addition to civilian deaths shown, 1,753 deaths took place among members of His Majesty's Forces (Reece, 1923).

From the data given in the table it is evident that the present epidemic surpasses in intensity any other outbreak recorded in this country. If it is considered that epidemic prevalence—if such a term can be applied to a condition which produces relatively few cases—began about 1936 or 1937, in duration the outbreak we are at present experiencing bids fair to be one of the most important on record. The table also shows roughly that cerebrospinal fever tends to occur in waves of varying amplitude. In the United States Hedrich (1931) showed that the interval between adjacent crests in different areas varies between six and twelve years, with occasionally intervals of even twenty-five years.

The outbreak of 1931–2 was of a magnitude comparable to that of the war years. It appeared at first that the present outbreak might be of a similar size, but during the first weeks of this year it became apparent that a much bigger epidemiological event was in progress. During the first thirteen weeks of 1940, 5,093 cases were notified —including non-civilian cases—so that it cannot be too strongly emphasized that the present outbreak is easily the largest in the records of this country.

Time Incidence

Table II gives the number of cases notified week by week in England and Wales, in London, and in certain other administrative areas. The weekly incidence of the disease for the whole of the geographical counties in England and Wales was tabulated, and those counties which showed the largest numbers of cases were chosen for further investigation. Table II deals only with these selected areas. It will be seen that in a period of eight weeks the incidence in the country as a whole increased sixfold. The peak of the epidemic—so far as is known at present—occurred in the week ending March 2, since when there has been a gradual decline. Although there was an increase to 521 cases in the week ending March 30, there was a decline—not shown in the table—to 436 cases in the week ending April 6. The weekly figures of incidence are reproduced for only a few of the counties in which most cases were notified, but it can be taken that in practically all the counties in which the disease was at all prevalent one or more cases had occurred during the week ending January 6. In almost all the counties in which the incidence was high the peak of the outbreak was reached during one or other of the two weeks ending March 2 and March 9 respectively. This suggests that the infection—in contradistinction to a prevalence of the meningeal complications—must have been widespread throughout the country before the close of 1939.

Geographical Distribution

The geographical distribution of the 1931–2 epidemic was dealt with by me in a previous paper (Underwood, 1933). The geographical counties in the order of prevalence of cases—not case rates—were: West Riding of Yorks, 1,358; Northumberland and Durham, 559; London, 421; Lancashire, 383; Notts, 231. It will be noted that all of these are industrial districts, and that there is no suggestion that towns on the coast were highly affected. The distribution of the civilian cases in the Great War epidemic was very different. The civilian mortality in 1915 was 80 per million in the South, 35 in the Midlands, 25 in Wales, and 12 in the North. It is probable that the high incidence in the South was due to the large aggregations of troops in these areas.

The present outbreak is very widespread, and there is no county in England and Wales which has not had at least one case. It is only remote and little-inhabited counties like Rutland, Huntingdon, Isle of Ely, Holland (Lincs), Westmorland, Anglesey, Cardigan, Merioneth, and Montgomery that have had under four cases each. In the thirteen weeks ending March 30 the highest number of cases in any geographical county was 414, in Lancashire. The administrative county of London had 331 cases. According to the actual number of cases recorded in the geographical areas, the counties follow in this order: Glamorgan, 308; Southampton, 294; West Riding of Yorks, 224; Surrey, 211; Warwick, 199; Kent, 194; Essex, 161; Stafford, 150; Monmouth, 145; Somerset, 140; Wiltshire, 133; Gloucester, 131; Middlesex, 121; Berks, 107; Leicester, 104; Durham, 102; Devon, 100. The remaining counties had fewer than 100 cases in the thirteen-week period. (It is worth while noting that the county of Denbigh had 93 cases.) County rates were not calculated, since the figures would be purely provisional and might give a misleading picture of the relative incidence. A feature of the incidence is that the three counties with the largest number of cases are counties

TABLE II.—*Notifications of Cerebrospinal Fever by Weeks in Certain Areas*

Area	Week ending													Total
	Jan. 6	Jan. 13	Jan. 20	Jan. 27	Feb. 3	Feb. 10	Feb. 17	Feb. 24	Mar. 2	Mar. 9	Mar. 16	Mar. 23	Mar. 30	
England and Wales	53	107	144	184	299	406	557	585	617	603	541	476	521	5,093
London	4	5	5	13	24	20	28	27	33	35	51	52	34	331
Lancashire Adm. County	2	1	7	5	7	16	13	11	19	10	14	13	15	133
Liverpool	4	3	2	3	3	7	13	19	14	13	15	11	8	115
Manchester	—	2	4	2	1	6	3	4	8	7	8	6	14	65
Glamorgan Adm. County	2	5	11	7	9	24	14	19	19	20	17	17	24	188
Cardiff	3	—	—	3	4	10	11	6	11	7	10	5	5	75
Swansea	—	—	3	1	4	1	7	4	6	4	5	3	4	42
Southampton Adm. County	1	3	3	5	14	12	25	26	15	11	12	12	9	148
Portsmouth	—	1	5	4	5	2	6	5	23	3	—	2	2	58
Southampton	—	—	1	—	3	6	12	12	9	9	2	3	7	64
Surrey Adm. County	2	5	12	9	10	22	27	21	18	20	22	18	9	195
Yorks W.R. Adm. County	—	—	—	2	8	4	6	5	11	12	9	9	8	74
Sheffield	—	—	—	2	—	—	3	9	3	11	9	13	7	57
Leeds	—	—	—	2	—	1	1	3	7	3	6	2	8	33
Bradford	—	—	—	1	—	—	2	2	2	8	1	4	1	21
Scotland	18	23	36	46	75	96	114	134	115	105	110	106	95	1,073

bordering the sea. Each of these counties has important ports or centres of military or naval activities. It is most significant that Wiltshire, which is obviously a centre for troops, had 133 cases. Similarly Dorset had 66 cases.

Further analysis of the five counties with the largest number of cases—Glamorgan, Lancashire, Southampton, Surrey, and the West Riding of Yorks—provides further interesting features. In Lancashire the incidence fell most heavily on Liverpool, Manchester, and the urban and rural districts of the administrative county. In all of these administrative areas the epidemic started either in the week ending January 6 or in the week ending January 13. Liverpool had 115 cases, Manchester 65, and 133 were notified in the administrative county. Salford had 22 cases, St. Helens 15, and Bootle 13. The other county boroughs escaped relatively lightly. In Glamorgan, Merthyr Tydfil had only 3 cases, but Cardiff had 75, Swansea 42, and the administrative county 188. Southampton administrative county had 148 cases, Portsmouth 58, and Southampton county borough 64. In the Surrey geographical area the administrative county had 195 cases and the remaining 16 were notified in Croydon.

The position of the West Riding is interesting in that the majority of the cases occurred in the administrative county and in the three largest cities. The administrative county had 74 cases, and Sheffield, Leeds, and Bradford had 57, 33, and 21 cases respectively. It is interesting to note that the three county boroughs which were most heavily involved in the whole of England and Wales in the 1931–2 epidemic—namely, Barnsley, Rotherham, and Doncaster—have each escaped so far with six cases or less.

In summarizing the incidence in England and Wales it should be pointed out that the disease has produced most cases in large industrial cities and in the ports. Scotland has been affected in similar fashion, since, as Table II shows, the general progress of the outbreak has been proportionally the same in Scotland as in England and Wales. The peak of the outbreak was reached in the week ending February 24, when 134 cases were notified, but the decline has so far been more gradual than the rise. Published figures show that the incidence in the large cities has been considerable. In the twelve weeks January 1 to March 30, and excluding the week ending January 20, concerning which data are not available at the moment of writing, 217 cases were notified in Glasgow and 154 in Edinburgh. Details of the position of the notified cases which have occurred in non-civilians in England, Wales, and Scotland are not at present known, but there is reason to believe that this proportion is not nearly as high as might be expected.

Age Incidence

The age incidence in the present epidemic is not known, but casual information which has come to notice suggests that a considerable proportion of the patients are older children and young adults—that is, the ages at which mortality is naturally lowest. In 1917, 12.5 per cent. of the cases occurred in children under 1 year old, 32.1 per cent. in children under 5, and 48.2 per cent. in children under 10 years. In London the corresponding figures were considerably higher. In an epidemic in Columbia in 1936 and 1937 Dauer showed that 68 per cent. of the coloured patients and 42 per cent. of whites were under 20 years old.

Family Infection

Since cerebrospinal fever is a condition essentially associated with overcrowding and bad ventilation it might be thought that multiple cases in households would be common. Such is not the case. There are many classical observations on this point which need not be mentioned. Similarly, recent results confirm these statements. Jimurà (1932), in Japan, showed that out of over 1,000 cases family infection occurred very rarely. Husein (1934), in Cairo, found that out of 1,090 cases two occurred in the same house on only twenty-six occasions, and three in the same house on only two occasions. Blackerby and Caudill (1938), in Kentucky, showed that of 290 families in which cases had occurred only 51, or 17.3 per cent., had multiple cases. Similarly, out of 1,624 cases Appelbaum (1938) found more than one case in a family in thirty-eight instances. At the present time general data on which this factor may be assessed are not available, and figures for my own area are too scanty to warrant quotation. Nevertheless the preliminary inference is that the present outbreak is no exception to the general rule so far as the incidence of family infection is concerned.

Method of Spread

It has long been held that the spread of cerebrospinal fever is essentially due to overcrowding and bad ventilation, and that when under such conditions a new strain of the meningococcus is introduced the non-contact carrier rate increases rapidly. Attempts were made to fix a maximum level for the percentage of carriers among non-contacts, above which cases of cerebrospinal fever would be likely to arise. In barracks and army huts this view was obviously important, and Glover's (1918a, 1918b) classical work on bed-spacing gave apparently satisfactory results.

It is now known that the proportion of the general population of the area who are carriers can vary within wide limits, and a similar variation may be found among actual contacts. For example, Silverthorne and his colleagues (1939), in Toronto, found that out of 327 contacts examined 31 per cent. were positive and that 94 per cent. of these organisms were virulent for mice. In 33 out of 42 families of patients it was found that one or both parents were harbouring the organism. During a period of over four years these workers examined 2,378 swabs, and positive results were obtained in 20 per cent. These authors suggest that the bactericidal power of human blood against the meningococcus, or the ability of strains to survive in human blood, may be as important in assessing the potential pathogenicity of a strain of the meningococcus for man as is an artificial mouse-virulence test. In the Sudan epidemic of 1932 Riding (1932) found that the contact carrier rate was only 6.2 per cent. In a Calcutta epidemic Russell (1936) found that 20 to 30 per cent. of healthy persons were carriers.

The work of Dudley and Brennan (1934) threw considerable doubt on the theory that epidemics of meningococcal meningitis are correlated with high incidence of carriers of the meningococcus. In the investigations of these writers, which extended over a period of nearly two and a half years at Chatham, it was shown that the mean carrier rate among non-contacts was 54 per cent. During this period only eleven cases of cerebrospinal fever occurred, and the carrier rate among contacts varied only from 9.4 to 14.3 per cent. On the theories current during the last war there should have been a large outbreak of cerebrospinal fever at the Chatham establishment. It would appear that the most likely explanation of the spread is that an epidemic is determined by the introduction into the community of an organism which is not only highly virulent but which is possessed in high degree of the power of invading the meninges. But much of this type of work has been done in a closed environment, and it is not always advisable to apply the results to open communities.

Much work has been done in the past on the relation between atmospheric conditions and the onset of cerebrospinal fever. No very definite conclusions have been reached, though it is well known that epidemics are more frequent in the spring. Recent work of Corkill (1939) is worthy of consideration. Working in the Sudan, he concluded that susceptibility to meningococcal meningitis is a deficiency state which is activated by the seasonal

advent of heavy ultra-violet-ray irradiation. According to Corkill the association with rainfall is incidental, and clouds are beneficial in that they reduce ultra-violet irradiation. As applied to northern latitudes this theory would mean that meningitis epidemics occur when the bright sunlight of spring accentuates the vitamin deficiency which has been experienced in the winter.

Mortality

The mortality from cerebrospinal fever varies enormously in different outbreaks. Many classical examples are well known, and the fatality rates in less-known outbreaks are summarized in Table III. The mortality also varies very largely according to the age of the person attacked. In the New York epidemic of 1904–5 the fatality was 73.5 per cent. in about 4,000 cases. A rate of 90 per cent. has been recorded. In the Glasgow 1906 epidemic the rate was 81 per cent., and in the ten-year period 1906–15 the rate in Glasgow was 71.9 per cent. MacNalty (1927) considered that this Glasgow rate was a fair average for the disease in an epidemic period. In recent years it was considered that the fatality was decreasing. Fairly frequent examples of high rates were found, however, in the epidemic of 1931–2. I myself reported such an outbreak in which the mortality was extremely high, despite intensive use of all the therapeutic measures then available (Underwood, 1932). Consideration of other data over a number of years gives strong support to the theory that cerebrospinal fever may be epidemic and highly virulent in one localized area, while in near-by areas the disease may be epidemic but of a more benign type. Few attempts have so far been made to explain these interesting occurrences. During the last two years the advent of chemotherapy has encouraged the belief that the fatality rate in an epidemic period will fall.

TABLE III.—*Cerebrospinal Fever: Mortality in Recent Epidemics*

Year	Source	Cases	Deaths	Fatality per cent.	Area
1939	Longe, Hervé, and Benderitter ..	12	5	41.7	Dahomey
1939	Dauer	338	145	42.9	Columbia (Washington)
1939	Silverthorne *et al.*	51	21	41.2	Toronto
1932	Williams	85	30	35.3	Sheffield
1932	Pacha	3,139	—	41.9	Egypt
1930	Atkey (1932) ..	865	665	76.9	Sudan
1932	Riding	4,333	2,239	51.6	Egypt
1926–8	Jimura	1,036	—	65.5	Japan
1918	Cadbury	1,232	968	78.6	Hong Kong
1929	,, ...	1,099	403	36.7	Shanghai
1932	,, ...	107	59	55.1	,,
1932	,, ...	207	122	58.9	Hong Kong
1932	,, ...	600	348	58.0	Macao
1930	German figures ..	663	351	52.9	Germany
1931	,, ..	574	307	53.5	,,
1932	,, ..	518	256	49.4	,,
1933	,, ..	598	280	46.8	,,
1934	,, ..	1,016	423	41.6	,,
1936	Cormack	139	75	53.9	Kenya
1936	,, ...	102	84	82.4	,,
1920–36		23,685	12,129	51.2	U.S.A. (22 towns)
1929	Branham (1937) ..	10,551	4,787	45.4	U.S.A.
1934	,, ..	2,500	1,107	44.3	,,
1935	,, ..	5,766	2,297	39.8	,,
1937	Sorel	521	345	66.2	French Niger
1937	,, ...	8,653	6,456	74.6	British Nigeria
1937	Van Campenhout (1938)	215	119	55.3	Belgian Congo
1936–7	Neff and Markides (1937)	800	—	34.0	Cyprus

Satisfactory figures for the present epidemic are not officially available for large numbers of cases, and in order to gain some idea of the effect of the new therapy throughout the country I made certain inquiries regarding the areas in which most cases have occurred. The registered deaths from cerebrospinal fever were tabulated for these areas week by week. Allowing one week or a portion thereof as the period between notification and death in any case, the fatality rate for each area has been calculated, using the deaths occurring in the week ending January 13 and the following weeks until the week ending March 30, and the notifications received in the week ending January 6 and in the following weeks until the week ending March 23. On this basis the following are the fatality rates for the different areas: Liverpool, 24.3 per cent.; Manchester, 27.5 per cent.; Cardiff, 14.3 per cent.; Swansea, 21.1 per cent.; Portsmouth, 26.8 per cent.; Southampton, 28.1 per cent.; Surrey County, 14.0 per cent.; Leeds, 32.0 per cent.; London, 28.6 per cent.; West Riding of Yorks, 34.8 per cent. (In the case of London and the West Riding the deaths of non-civilians are not included, so that in these two areas the true fatality rates may be slightly higher than the rates given. In the other areas mentioned deaths of non-civilians are included, but actually these Service deaths were few.) The case mortality rate for these areas taken together—based on 216 deaths in 901 cases—is 24.0 per cent., which presumably represents the average figure for the country as a whole. It should, however, be mentioned that the fatality rate based on 978 cases occurring in Scotland during the corresponding period is only 8.9 per cent. If the figures for Scotland are included with the selected figures for England and Wales the combined fatality rate is reduced to 16.1 per cent. It should be said that these figures are extremely satisfactory, and that they mark a very distinct advance on anything previously experienced in connexion with the fatality from this serious disease.

The particularly interesting feature of these rates is the fact that they are uniformly low, when considered in the light of all previously accepted figures for the mortality from this disease. Although the West Riding rate of 34.8 per cent. is based on a small number of cases, there may be a suggestion here that the organism is more virulent in Yorkshire than in certain other parts of the country. This suggestion receives some confirmation from the fact that the Leeds fatality rate is 32 per cent. It is perhaps the case that the particular strain of the organism which is prevalent in the West Riding is especially virulent, as in the 1931–2 epidemic.

Prophylaxis

The prophylaxis of the disease is very adequately dealt with in the recent circular issued by the Ministry of Health. If it is true that the fatality can be reduced to an approximate level of 20 per cent. or less, then more active measures are certainly not advisable. Nevertheless, I do not think that experiments on active immunization should be completely discouraged, since at any time a resistant strain of the organism may be introduced into the community. In the Colonies the need for a satisfactory method of active immunization has long been apparent.

Such a method was first tried by Davis in 1907. In 1917 Greenwood discussed the results of inoculation of over 4,000 persons with a polyvalent vaccine in Salisbury, and he made out a prima facie case in favour of prophylactic inoculation. In 1923 Calbairac used two injections of a vaccine prepared from local strains. Riding and Corkill (1932) carried out an extensive experiment in 1931. In all 10,000 persons were vaccinated and the experiment was carefully controlled. There was, however, no appreciable difference in the incidence in the two groups. In 1933 Ismaïl reported on the vaccination of 74,000 persons in Turkey, but again the results were not conclusive. In 1935, in India, Russell (1936) vaccinated two series of persons during a large epidemic in a prison containing 2,004 people. Half the population were inoculated and the other half were used as controls. There were no cases in either group. In a Borstal insti-

tution 766 persons were inoculated and a similar number were used as controls. No cases occurred among the vaccinated persons, but there were six cases in the controls. Pergher and Portois (1936) vaccinated 120,000 persons with vaccine prepared from local strains. There were no cases among the vaccinated population. Saleun and Ceccaldi commented on their vaccination experiments in 1936, but the figures given are not complete. In 1938 Kuhns and his colleagues (1938) carried out interesting experiments in certain camps in the United States. They used a filtrate of the meningococcus for skin-testing and later for immunization. The testing was found to be hardly worth while, and at a later date all persons were immunized regardless of their reaction to the intradermal tests. These authors give an interesting table, but there is no evidence that the prophylactic treatment actually had any effect on the incidence of the disease in the camps. Sorel (1937, 1938), in Africa, inoculated about 5,000 persons, none of whom contracted the disease. Some cases occurred among the controls, but the number of these controls is not adequately stated. The most recent experiment on this subject was carried out by Maclean and Bevan in Cyprus in 1936–7. Unfortunately this careful experiment began during a waning epidemic and the results are therefore inconclusive.

It is not sufficiently realized that, in assessing the value of experiments of this type, it is fundamental that certain conditions should be satisfied. (*a*) The experiment must be adequately controlled and the number of control individuals stated. (*b*) The control individuals should be drawn from the same population as the inoculated individuals, the age grouping should be approximately the same in the two series, and no selection should be exercised in determining which individuals receive the treatment and which do not. (*c*) Inoculated and controls must be exposed equally to infection. (*d*) Infection should be sufficiently widespread to ensure that a significant number of controls actually contract the disease after exposure.

Maclean and Bevan (1939) give a table showing a few details of many of the previous experiments on prophylactic inoculation against cerebrospinal fever. I carefully perused the original papers dealing with these experiments, but in certain instances was unable to confirm the figures given for control groups. It would appear also that the total figures in the table referred to are somewhat excessive, since the experiment recorded by Russell was probably that reported previously by Yacob (1935). Further, it seems very probable that the experiment mentioned by Le Bourdellès and Sédallian (1930) is that previously described by Bruynoghe and Walravens (1926). Particular attention was paid to the four conditions enumerated above, and those experiments which did not conform to the conditions were discarded. To the data which remained tests of association were applied, and the results are summarized in Table IV.

TABLE IV.—*Cerebrospinal Fever: Inoculation Experiments*

Reference and Area	Inoculated Persons		Controls		χ^2	n	P
	Not Attacked	Attacked	Not Attacked	Attacked			
Bruynoghe and Walravens:							
(*a*) Etoile-Ruashi ..	877	0	2,658	16	4.02	1	0.04
(*b*) Panda-Likasi ..	1,113	0	4,027	2	0.01	1	0.92
(*c*) Kakontwe ..	380	0	811	3	0.32	1	0.57
(*d*) Kambove ..	634	0	350	0	—	—	—
(*a*), (*b*), (*c*), (*d*) ..	3,004	0	7,846	21	4.35	4	>0.29
Russell:							
(*a*) Prison	1,002	0	1,002	0	—	—	—
(*b*) Borstal	766	0	760	6	4.18	1	0.04
Zrunek and Feierabend (1931)	22,175	5	19,678	6	0.00	1	1.00
Riding and Corkill:							
(*a*) Original figures	10,189	9	10,120	13	0.43	1	0.51
(*b*) Emended figures	10,189	9	18,153	34	3.58	1	0.06

In this table Yates's correction was used in computing the χ^2 values.

A χ^2 value of 3.841 means that a difference as great as that actually observed between the two sets of observations would be likely to occur by chance alone in 5 per cent. of an infinitely large number of trials on the scale reported. Similarly, a χ^2 value of 6.635 or over means that a difference as great as that actually found would be expected to occur by chance in only 1 per cent. or less of such trials, if repeated tests of the same magnitude were carried out. Where, therefore, a χ^2 value between 3.841 and 6.635 was observed the difference between inoculated and uninoculated was taken as being unlikely to have arisen by chance alone. Where the χ^2 value is over 6.635 the corresponding difference was regarded as undoubtedly significant.

Excluding the combined observations of Bruynoghe and Walravens, and the original figures of Riding and Corkill, we are left with eight series of observations in Table IV. In two of these eight series there is therefore some evidence that chance alone could not have caused the difference in the incidence of cerebrospinal fever in the inoculated and in the control groups respectively. If environment and exposure to infection were really equal in the corresponding groups the inference is that the real differences in incidence were due to the effects of the inoculations. It may therefore be suggested that the case for prophylactic inoculation in cerebrospinal fever is still very much *sub judice*, though possibly rather stronger than it was when Professor Greenwood examined the problem over twenty years ago. It is certain that the further investigation of the question is a matter for carefully controlled investigations. It is certain also that the time is still far distant when the individual practitioner will be able to consider prophylactic inoculation as a method of dealing with contacts.

Turning for a moment to the immediately practicable aspects of prevention, reference should be made to the vast changes in environmental and social conditions which have been brought about by the war. Evacuation has led to the development of complex changes affecting the normal host–parasite relationship. It is a suggestive fact that most of the counties which are now suffering most heavily from the prevalence of cerebrospinal fever are either within easy travelling distance of a great city or themselves contain such a city within their boundaries. Overcrowding in billets must be guarded against, and in the case, for example, of voluntary evacuation to the houses of friends it is desirable that children should not be sent needlessly from one reception area to another.

The war has also led directly to the congregation in schools and halls of large parties of men and women engaged on civil defence duties. The Home Office A.R.P. Circular No. 134 suggests 14 square feet per man as a suitable standard for superficial area in new buildings erected for the billeting of such personnel. Such a standard is obviously likely to encourage the spread of droplet infection. I have long been aware of the dangers associated with the billeting of these parties. In order to minimize the risk, at the end of February I recommended the A.R.P. controller of the area to agree to the granting of a concession to members of the casualty service personnel. It was recommended that one-third of the men should leave their depots at 10 p.m., sleep in their homes, and return to duty at 8 o'clock the following morning. The men chosen must all live within easy distance of their depots, and they must report

immediately should an air raid occur. The total number of men affected is about 900, and the arrangement is still in force. So far no case of meningococcal infection has been found among the personnel. There is of course no proof that the arrangements made did produce this result. A further difficulty directly attributable to the war is that of ensuring sufficient ventilation in buildings during the "black-out." This difficulty is especially marked in depots used for the billeting of civil defence personnel. These buildings do not always have an efficient system of artificial ventilation, and natural ventilation by windows and doors has to be employed. It is possible to provide a satisfactory type of blind or curtain. The windows should always be opened wide after "lights out."

Treatment

The treatment of the disease by polyvalent and by monovalent serum has been sufficiently discussed in the past. Ferry's meningococcus antitoxin has been less used, and it need not be dealt with here. It should be mentioned, however, that, despite the relative success which followed the use of serum in large doses in many areas, outbreaks occurred in which there was doubt whether the serum was as efficient as it should be. For example, Cadbury (1934), in China, stated that the serum was not of much use, and the opinion of those who were in charge of the patients was that lumbar puncture was more effective. At Anhwei there was a mortality of 40 per cent. for untreated cases and 5 per cent. when lumbar puncture alone was employed. Walsh in 1938 reviewed 23,685 American cases occurring between 1920 and 1936. He concluded that there was no evidence that the use of serum had lowered the fatality in recent years. Sorel, dealing with the epidemic in French Niger in 1937, stated that when the treatment consisted of serum together with fixation abscesses 50 per cent. of the patients died. In one province where the treatment consisted only of lumbar puncture together with fixation abscesses, only 9 deaths occurred in 59 cases.

Chemotherapy appears to have been used first by Zeller, Riecke, and Krause, who employed prontosil in 1935. (I have been unable to confirm this reference.) Buttle, Gray, and Stephenson (1936), and later Proom (1937), showed that *p*-aminobenzenesulphonamide would confer on mice a certain degree of protection against the meningococcus. In 1937 Schwentker, Gelman, and Long used such a drug in 10 cases with one death. In 1936 Roche and McSweeney were using a prontosil compound in Dublin, and thereafter case reports became fairly numerous. For example, Willien reported 5 cases (all cured) in 1938. In 1938 Smith, Maxson, and Murphey analysed 157 cases. They found that the fatality was much lower—about 25 per cent.—when serum was not injected to the theca; treatment by intravenous antitoxin with sulphanilamide gave a fatality rate of 12.5 per cent. Sprockhoff reported 15 cases with two deaths in 1939, and Osborn (1939) of Birmingham employed sulphapyridine (M & B 693) with daily lumbar puncture in 3 cases, all of which recovered. Schaefer (1939) treated 17 cases with uleron by mouth together with lumbar puncture; there was a fatality rate of 64.7 per cent. (not 61 per cent., as stated in Schaefer's paper).

Two important communications appeared a year ago dealing with work carried out in the Sudan. Somers (1939) stated that during the years 1934–8 there had been 21,599 cases in the Sudan, with 14,816 deaths. He treated 143 consecutive cases with small doses of sulphapyridine. The fatality rate was reduced to 10 per cent. In all the cases the drug was administered intrathecally, and in most cases also by another route. Bryant and Fairman (1939) treated 21 cases with prontosil and tablets of sulphanilamide; there was one death. They later used sulphapyridine administered intramuscularly. In the whole series of 168 cases there were only 8 deaths—a fatality rate of 5 per cent.

Roche and McSweeney reported the results of their work in Dublin. In 1935–6 they were using the accepted methods of serum treatment; the fatality rate was 75.0 per cent. Between 1936 and 1938 they used prontosil or soluseptasine in addition, and the fatality rate in 56 cases was 57.14 per cent. In 1938 and 1939 they used only sulphapyridine orally, and the fatality rate was reduced to 7.14 per cent. in 14 cases.

The most important work which has been done on the subject in this country is that of Banks, and anyone who has to treat cases of the disease should refer to his original papers (Banks, 1939, 1940). The recent Memorandum of the Ministry of Health gives an excellent summary of the present position, based largely on Banks's views. The technique of treatment by this method will therefore not be discussed here. Excluding untreated or inadequately treated cases, Banks had only one death in 80 consecutive cases of cerebrospinal fever treated by chemotherapy alone. Emphasis is placed on the necessity for adopting a high initial dosage and for giving subsequent doses according to a prescribed scale, depending on the age of the patient. The oral route can often be employed throughout the illness, but occasionally resort has to be made to intramuscular injection of the sodium salt of sulphapyridine.

Through the courtesy of the medical superintendents of the hospitals for which I am responsible, information regarding the treatment of 50 cases of cerebrospinal fever was collected. The results are given in Table V. From this table it will

TABLE V

Method of Treatment	Cases	Deaths	Fatality Rate per cent.
Serum alone	27	19	70.4
Serum and sulphanilamide	6	3	66.7
Sulphanilamide (alone or with drugs)	3	3	
Serum and sulphapyridine	2	—	7.1
Sulphapyridine alone	12	1	

be seen that with serum alone the fatality approximates to the rate which is commonly found during epidemic periods, but is rather high for sporadic cases. Treatment by means of sulphonamide preparations—with the exception of sulphapyridine—was very disappointing. The prontosil used was mainly the album variety, but in a few cases prontosil rubrum solution was injected intrathecally. There was no significant difference between these results and those obtained by serum treatment alone. On the other hand, treatment by sulphapyridine gave eminently satisfactory results—especially in view of the fact that most of these patients were treated during the present outbreak. The ages of the patients ranged from under 1 year to 76 years. Twenty were aged 5 years or under, so that in general the age grouping was unfavourable to a high recovery rate. No useful purpose would be served by giving details of the age grouping in this small series, but it may be said that five of the patients who had sulphapyridine were aged 5 years or under. The patient in this group who died was 2 years old.

There is obviously a very significant difference between the results obtained in the sulphapyridine series on the one hand and in the serum and sulphanilamide series on the other. There is, however, no significant difference between the results obtained in the serum and the sulphanilamide groups. It may be suggested that if the dosage of sulphanilamide had been higher the results would have been better. This may be so, but it should be noted that the figures for sulphanilamide do not differ very largely from those obtained by Roche and McSweeney. One feels inclined to doubt the efficacy of sulphanilamide against certain strains of the organism. The reports of this series of cases confirm the fact that chemotherapy materially shortens the duration of the illness (the shortest period of recovery in hospital was twenty days) and hastens the clearing of the cerebrospinal fluid.

General Remarks

The present wide-spread outbreak of cerebrospinal fever has given unrivalled opportunities for the testing of chemotherapy, and the results so far obtained have been extremely encouraging. Nevertheless, I am of the opinion that the prevailing strain of the organism is not as virulent as was the case in some previous epidemics, or that the factors which make for virulence are not present to

the same degree. One would like to be certain of the effects of chemotherapy in an explosive outbreak of cerebrospinal fever occurring in a circumscribed area. The time factor in the host–parasite relationship must also be taken into account, and a considerable period must therefore elapse before a final conclusion can be reached.

In the matter of prevention any measures which are liable to minimize the overcrowding, bad ventilation, and gross dispersal of individuals occasioned by the war should be encouraged. Prophylactic inoculation is still an experimental problem, and no useful purpose would appear to be served by its employment in this country. In the treatment of carriers there would seem to be opportunities for further investigation regarding the effects of chemotherapy.

Summary

The epidemiology of cerebrospinal fever is discussed in relation to the present outbreak. During the first thirteen weeks of the year 5,093 cases were notified in England and Wales. This figure exceeds the total notifications in the years 1915, 1916, and 1917 taken together. The peak of the outbreak occurred in the week ending March 2; the decline has been slow and interrupted.

Analysis of the geographical distribution showed that every county was affected. Most cases were notified in Lancashire, London, Glamorgan, Southampton County, the West Riding, and Surrey—in that order. Areas especially affected were the large industrial cities, the ports, and the reception areas. Scotland was affected similarly.

From data covering a large population it is estimated that the average fatality rate in the present epidemic is 24.0 per cent., though there is considerable variation between different areas. The fatality in Scotland is lower.

The history of inoculation against cerebrospinal fever is reviewed. Many of the recorded experiments do not permit of further investigation. A statistical analysis of eight series of observations is given, and it is shown that in only two of the eight could it be said that chance alone could not have caused the difference in the incidence of cerebrospinal fever in the inoculated and in the control groups respectively. The value of this method of prevention is still *sub judice*. Such experiments should satisfy certain necessary conditions.

Practical measures of prevention are discussed. Emphasis is placed on the practicability of reducing the density of population in A.R.P. depots at night. Adequate ventilation in the "black-out" is essential.

The literature of chemotherapy in cerebrospinal fever is briefly reviewed. In a small series of cases it was found that with sulphapyridine the fatality was 7 per cent., whereas with serum or sulphanilamide it was over 60 per cent. There was thus a significant difference between the results obtained with sulphanilamide and with sulphapyridine respectively. Though the sample is small, the results are similar to certain other published figures.

I am indebted to the medical officers of health of the administrative areas mentioned in the text for their kindness in supplying me with certain figures regarding deaths in their areas. I have also to thank my colleagues, Mr. O. R. M. Kelly, F.R.C.S., Dr. Donald MacIntyre, and Dr. B. Rivers-Pitt, for supplying me with the case sheets of the local cases, and for other assistance.

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The congress of 550 students which met at Leeds recently, and which was organized by the National Union of Students, considered through one of its commissions the relation between medical problems and modern social conditions. The difficulties of the medical profession were considered to be insuperable under existing social conditions; only by a fundamental alteration in the condition of life of the population could there be any great reduction in the high incidence of tuberculosis, venereal diseases, and rheumatic diseases affecting the heart, etc. A resolution was passed by 448 votes to 1 urging the need for a unified and comprehensive system of free health services. As an immediate step national health insurance should be extended to include dependants and old age pensioners. Later in the congress forty medical students from medical schools in England and Scotland discussed some general problems. There was a feeling of isolation of the medical students from the rest of the student body, and an appeal was made for closer and more friendly student co-operation. The inertia of medical students was felt by many to be due to the "faculty management of medical societies." As regards the curriculum opinion was divided between removal of some of the scientific subjects and minor changes only. It was considered that many of the faults might be overcome by a closer relation of anatomy and physiology to clinical practice. Non-medical courses directed to broadening the cultural background were urged, as also were experience of general practice, training in psychology, and a compulsory year of internship before final qualification.

GOITRE IN SOUTH WALES

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In 1901 Sir James Berry drew attention to South Wales as an area in which goitre is endemic. He referred particularly to Glamorganshire, and commented upon the fact that, although goitre is said to be unknown on the sea-coast, he had observed cases among people who lived, and had always lived, close to the shore of the Burry Estuary; he had also found cases near Llanelly in relation to the coal measures of the carboniferous series of rocks. Peter McEwan (1938), in a tabular analysis of the distribution of deaths prepared from the Registrar-General's returns for the year 1936, drew attention to a high and increasing death rate from thyrotoxicosis, and it was evident that the mortality was strikingly high in certain Welsh counties.

We are not here concerned with the relation of goitre to altitude, the sea-coast, or prevailing soils, but rather with the life history of that variety of goitre commonly found in South Wales and its relation to other diseases of the thyroid gland. Although goitre appears to be prevalent throughout the whole of South Wales, Barry, on the Severn Estuary eight miles from Cardiff, has long been recognized locally as a "goitre area," and the large number of cases we have had from this area seems to be some justification for the contention. Within the last few years an experiment has been carried out which may reduce the goitre incidence in the Barry district: the water supply has been changed. Despite a good deal of recent work, knowledge of the aetiology of endemic goitre has not advanced much since Theodor Kocher of Berne said that he did not know what was the cause of Swiss goitre, but that it was "something in the water," and insisted on his family drinking only boiled water because he knew that boiling destroyed the goitre-producing property.

The prevalent local variety of goitre has a life history of its own and passes through distinctive phases, so that what appear to be different varieties of goitre are recognizable in the same patient at different periods of life. In its early stages the thyroid enlargement is a simple diffuse one unproductive of symptoms, and in this respect is to be distinguished from primary diffuse toxic goitre (Graves's disease). Primary diffuse toxic goitre appears to be neither more nor less common in South Wales than in other parts of the British Isles, and we have not found any support for the statement that where goitre is endemic Graves's disease is rare. Both varieties of goitre are common in South Wales.

In the course of 600 goitre operations performed during the past fourteen years on patients in South Wales we have encountered cases of foetal adenomatous goitre in which the foetal tumours have been both single and multiple in type, cysts in the thyroid gland, the different forms of malignant disease of the thyroid, suppurative thyroiditis, Riedel's disease, Hashimoto's disease, and the rare diffuse thyroid adenomatosis in which the whole gland has a granular consistency. It seems, therefore, that most varieties of thyroid disease occur locally in addition to the endemic form of goitre with which we are here concerned.*

* We have not so far met with gummatous or hydatid disease of the thyroid.

Life History of Local Goitre: (1) Diffuse Goitre

The endemic disease appears in adolescence or a few years later as a soft symmetrical diffuse enlargement of the gland, at first little more than a fullness in the lower part of the neck of a young woman. The disease is preponderant in women, being probably some twenty to thirty times commoner in them than in men. In its early phase the goitre is simple and diffuse, and distinguished, as already mentioned, from Graves's disease by the absence of thyrotoxicosis; but in younger patients it bears a close resemblance to puberty goitre, which is probably a normal response during a period of physiological stress. Whereas puberty goitre gradually subsides with the onset of adolescence, the local endemic goitre persists and gradually gets larger and firmer in consistency. In this early phase few patients report the condition, probably because of the absence of symptoms, its common appearance in their relatives and friends, and a natural optimism that it will gradually subside in the way that puberty goitre has been seen to disappear. In the course of time, however—usually some months, but it may be even several years—nodules develop in the otherwise diffusely enlarged thyroid. When the gland is carefully palpated these nodules may be felt as an odd bulge or thickening, often at one pole, but when they attain a certain size their presence may be suspected from an appearance of irregularity of the gland.

(2) Adeno-parenchymatous or Bosselated Goitre

The patient now has a bosselated or adeno-parenchymatous goitre still unproductive of symptoms, but becoming rather more unsightly as the gland continues to enlarge. There may be many nodules palpable in the gland, varying in size from that of a cherry stone to that of a plum stone or even larger. If these nodules are examined in a piece of gland removed at this stage they will be found to consist of aggregations of distended vesicles filled with colloid, and the cut surface of the gland may resemble a piece of plum-cake. As the nodules enlarge, vesicles adjacent to them are compressed and undergo a pressure atrophy to form false capsules round the colloid masses, which have incorrectly been called adenomata.

At this stage the bosselated or adeno-parenchymatous goitre has to be distinguished from multi-adenomatous goitre in which true adenomata (so-called foetal adenomata) are present. In this form, however, the goitre is due entirely to the foetal tumour or tumours, and the thyroid gland is not also diffusely enlarged as in the adeno-parenchymatous variety. Foetal adenomata are readily recognizable on microscopical examination, since they resemble undeveloped thyroid tissue and consist of masses of tiny unexpanded vesicles, which contrast graphically with the colloid distended vesicles comprising the bosses of old endemic goitre.

(3) Thyrotoxicosis

The third stage of the local endemic goitre is the appearance of signs and symptoms of thyrotoxicosis. The patient now has adeno-parenchymatous (bosselated) toxic goitre. The thyrotoxicosis in these cases is rarely as acute as in Graves's disease, and the term "formes frustes," in use in Continental clinics, might be applied to many of them. This phase of thyrotoxicosis, which in contradistinction to the primary thyrotoxicosis of Graves's disease has been termed secondary because it does not arise coincidently with the goitre, may not be present for many

years; sometimes, however, it appears quite soon after colloid nodules have developed. Precipitating factors seem to be emotional disturbances, as so often noted in cases of Graves's disease (Goodall and Rogers, 1933), infections such as an attack of influenza, and fatigue, particularly if associated with worry and anxiety. Eye signs are only very occasionally present, the chief manifestations of thyrotoxicosis being tachycardia and attacks of palpitation and dyspnoea on effort. Auricular fibrillation is found in many of these patients, and more often than in the primary and acute variety of Graves's disease. Malnutrition is a feature of this form of thyrotoxicosis and may become extreme in long-standing cases, when the appearance of the patient may even become cachectic. The appetite is good despite a loss of weight, and the patient expresses herself as being better in cold weather than in hot. These changes may be so gradual as to pass almost unnoticed in a middle-aged woman, particularly if she is of the industrial class, whose life is usually hard. In South Wales, especially of late years, this has been the case, with the result that, as in the common variety of anaemia of middle-aged women, the condition is frequently well established and often severe when advice is sought.

Treatment

Many of these patients are referred for treatment in the third or toxic phase; a few report the condition in the second phase when bosselation is present without symptoms, but very few in the earliest or diffuse phase. Once it has appeared the thyrotoxic state becomes steadily worse, and no medical treatment is permanently effective. The place of medical treatment is to bring about a reduction of the intoxication and to get the patient as well as possible for partial thyroidectomy—the surgical procedure of choice. We cannot go into details of treatment here except to say that rest, iodine, and small doses of digitalis form the basis of the medical preparation, and that bilateral subtotal resection is the principle of surgical treatment. If thyrotoxicosis is severe a preliminary-stage operation such as arterial ligation may occasionally be necessary, but such operations are less often needed today, as patients are now coming earlier for treatment. This is in part due to the wider recognition by practitioners of the progressive nature of adeno-parenchymatous toxic goitre and the earlier reference of their patients for treatment, and partly to the patients themselves. After a timely operation the patient often undergoes such a striking change in appearance in a few months as to be almost unrecognizable, so great is the improvement in her general health. Few cases give such gratifying results alike to patient, practitioner, physician, and surgeon as do those of toxic goitre, and one or two patients who have experienced the great benefit of subtotal resection form that little leaven which has such a potent effect on those around them. The root of the matter, however, needs attention, and it is to be hoped that in the course of time the incidence of this condition will be much lessened. Wherever it is found endemic goitre is a challenge to public health authorities, and its prophylaxis is all-important.

Results

With pre-operative treatment, selection of a suitable operation, and the use of local anaesthesia the mortality should be less than 1 per cent. There have been no deaths from post-operative thyroid reactions in over 300 consecutive operations for thyrotoxicosis; but, despite the employment of local analgesia and the avoidance of inhalational anaesthesia, the chief danger lies in chest complications in old-standing and late cases in which local pressure symptoms are also present. Three patients have died while in hospital, four days, six days, and fourteen days after operation, the cause of death in each case being bronchopneumonia and cardiac failure. These patients were already wrecked by the advanced stage of the disease and had pressure as well as toxic symptoms to contend with. During the preparation of patients for operation particular precautions need to be taken against their contracting colds or other intercurrent infections. One of our patients died from a rapidly developing bronchopneumonia as a sequel to a common cold while awaiting operation. The early toxic case of adeno-parenchymatous goitre, however, presents a minimum of risk and offers a maximum of satisfaction from combined medical and surgical treatment.

We wish to emphasize the vital importance of early diagnosis and opportune surgical treatment, as only too often cases are allowed to develop irreparable degenerative changes in the circulatory system. This applies to cases of thyrotoxicosis generally, and the public and the profession still need educating in the fact that myocardial disease is as likely to occur with some forms of goitre as valvular disease is apt to follow acute rheumatism. Certain cases in the past have been termed idiopathic cardiac hypertrophy when the goitre was not obvious; obscure cases of congestive failure are not infrequently the result of thyrotoxicosis, and many unexplained cases of persistent tachycardia are of thyroid origin. Strickland Goodall was one of the first to draw attention to the thyroid origin of many obscure cases of heart disease and to insist on the importance of safeguarding the heart from the ravages of thyrotoxicosis by timely operation on the thyroid gland (Goodall, 1920; Goodall and Rogers, 1920). More recently John Hay (1936) of Liverpool and others have reminded us of the great importance of masked cases of thyrotoxicosis.

Summary

In South Wales most varieties of thyroid disease occur, and goitre is endemic also.

The endemic goitre appears as a diffuse enlargement, becomes bosselated and then toxic (adeno-parenchymatous toxic goitre).

Thyrotoxicosis when established is progressive and inevitably leads to heart disease, which quickly becomes the predominant affection.

The treatment is subtotal bilateral resection of the bosselated toxic gland following a course of appropriate medical treatment. A preliminary-stage operation such as ligation may occasionally be required in the most toxic cases.

Operative risk in early cases is minimal with the use of local analgesia and an appropriate technique. In late cases with pressure as well as toxic symptoms chest complications increase the risk and are responsible for occasional fatalities, occurring from a few days to a fortnight after operation. These may be avoided by recognizing the necessity for treatment before the patient is wrecked by the disease. Prophylactic treatment of endemic goitre is urgently wanted. The early recognition of thyrotoxic heart disease is much needed.

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RENAL THRESHOLD FOR GLUCOSE: NORMAL AND IN DIABETICS

BY

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The renal threshold for glucose is of great interest to physiologists in relation to kidney function and of importance to clinicians in the study and treatment of glycosuria and diabetes. The term is applied to the critical concentration of sugar in the blood which determines the presence or absence of glycosuria. Below this level sugar is absent in the urine except in such minimal amounts as are always present and are not appreciated by the usual tests, Fehling or Benedict; while above this level easily appreciable amounts of sugar appear in the urine and gradually increase both in total amount and in percentage concentration as the blood sugar becomes progressively higher. The renal threshold is usually found to be between 170 and 200 mg. per 100 c.cm., depending rather on whether the analysis is made on venous or capillary blood. It is a common statement in medical literature that "the *normal* renal threshold is 170 mg. per 100 c.cm.," and a common implication that any deviation from this level is an abnormality, implying disorder of function if not disease of structure on the part of the kidney.

It has been recognized for forty years that deviations from this normal figure occur in both directions—that many individuals pass sugar in the urine when the blood sugar is below 170 mg. per 100 c.cm., and that many diabetics show no glycosuria when the blood sugar is considerably higher; in other words, that the kidney is more or less permeable to sugar than usual. Are these deviations to be considered as abnormalities or has the usual conception of the normal to be reconsidered?

Physiologists are not entirely agreed on the mechanisms of sugar excretion, but the commonest explanation is that glucose from the blood diffuses readily through the glomeruli, passes down the tubules in the glomerular filtrate, and is reabsorbed there to avoid the waste of a valuable substance. It is not thought probable that the tubular area actively secretes or excretes sugar into the urine, and so the presence or absence of sugar depends mainly on the reabsorptive power of the tubules. Whatever the detailed mechanism, it is clear from clinical observation that the kidneys are often more or less permeable to sugar than the accepted normal.

Determination of Renal Threshold

This is simple and consists of a *simultaneous* comparison of glycaemia and glycosuria, which is most satisfactorily carried out by the standard glucose-tolerance test where the blood sugar is estimated every half-hour for two hours after a dose of glucose. It is essential, if the threshold is to be ascertained with any accuracy, that the bladder should be emptied and separate samples of urine tested every half-hour, a point that is often neglected. Indeed, tests at more frequent intervals, say every fifteen minutes, are likely to catch the threshold more accurately, but it is impossible for many people to pass urine so often. Less elaborate and often equally clear is a single estimation of blood sugar and the testing of two samples of urine, the first passed immediately before (the bladder must be completely emptied) and the second as soon as possible after the blood sugar has been estimated. The *second* specimen is therefore secreted at a known blood-sugar concentration and gives information on the threshold. For instance, in insulin-diabetic patients whom I suspect of a low threshold because the glycosuria persists even when the blood sugar has been reduced the blood is tested and the bladder emptied at the height of insulin activity (usually four hours after breakfast) and a second urine obtained as soon as possible and certainly before more food is taken. If this second specimen contains sugar and if the blood is below the normal threshold—say between 100 and 140 mg.—then a low threshold is clearly established. A point of possible error to note is that if the first voiding contains a heavy amount of sugar the second may contain traces without actual sugar being secreted from the kidneys, presumably through even a minimal "wetness" remaining in the bladder. I had this proved many years ago on a series of non-diabetic cystoscope cases by filling the bladders with 5 per cent. glucose, draining this completely, and testing a subsequent sample passed naturally. About a quarter of these samples showed traces of sugar.

Permanent Deviations of Threshold

Variations of the threshold from the accepted normal are very common, but it is impossible to state in what percentage of the population they occur, as no extensive investigations have been undertaken.

A *low renal threshold* is often found in life assurance and other routine tests, and if the glycosuria is proved to accompany a normal blood-sugar concentration it can be regarded as a harmless anomaly consistent with perfect health and indicating neither disturbed carbohydrate metabolism nor renal disease. The condition is usually and best called *renal glycosuria*, but diabète rénal and orthoglycaemic glycosuria are other names for it. I have met it at all ages from 2½ to 80, and in my experience it generally persists throughout life. This renal anomaly has a strong hereditary tendency, and it runs in many families as a dominant Mendelian characteristic. The condition has been recognized for years, and the affected individuals are now accepted by most insurance companies as first-class lives.

Two points of error on the subject still occur in some textbooks. It is often stated that the degree of glycosuria is *independent of carbohydrate intake*. This in my experience is quite wrong. If the threshold is only moderately low, say 130 mg., then glycosuria appears only after a large carbohydrate meal. If the threshold is under 90 mg., sugar is also excreted even in the fasting condition, but more is excreted when the blood sugar rises after carbohydrate food or a glucose test. If more sugar is not excreted at the higher blood-sugar levels at the peak of a curve it is probable that the reducing substance is not glucose but lactose, laevulose, or pentose, all non-threshold substances which filter through the kidneys in constant small amounts. Again, it is frequently stated—indeed by Joslin (1937)—that a case of renal glycosuria should be watched and the diet be somewhat restricted for a few years before the conclusion is reached that the condition is harmless, although that author admits that he has never seen a case develop into true diabetes. I have seen two cases become diabetic, but this is not unnatural in over 300 cases discovered. If normoglycaemic glycosuria is proved by a thorough investigation, such as the finding of a normal blood-sugar curve, then I think the whole condition can be neglected at once and for ever. At any rate, I have never regretted acting on this opinion.

A *high renal threshold* has naturally been noted mostly in *diabetics*, because they alone have blood sugars which exceed the normal accepted renal threshold of 170 to 200 mg. per 100 c.cm. It is common to find that a diabetic becomes sugar-free on treatment and yet his blood sugar is found to be between 200 and 250 mg. or occasionally even higher. This occurs most frequently, I think, in elderly patients, but I have seen it in a few children and several young diabetics with healthy kidneys and showing normal renal function tests. A high renal threshold is very common in chronic sclerosing nephritis (Castaigne and Chaumerliac, 1939), and it is well recognized that the development of progressive sclerotic lesions may bring about the disappearance of glycosuria at a blood-sugar concentration which produced abundant glycosuria before the onset of kidney disease.

There is clear evidence that *non-diabetics* may also have an unusually high renal threshold. During investigations of the hyperglycaemia produced by anaesthesia it has been observed that the blood sugar may exceed 200 mg. without the appearance of glycosuria. That this is not the effect of anaesthesia on the threshold is shown by the fact that other cases do pass sugar during anaesthetic hyperglycaemia. Mann (1925) has shown that often the threshold is high in non-diabetic psychotics.

The frequency with which deviations of the threshold occur in the population is not known, as probably only a very small proportion of renal glycosurics are ever discovered, and persons with a high threshold never. From diabetics with normal kidney function we can get a rough idea of the percentage involved, from which we can draw conclusions, in my opinion fair ones, about the population at large. In a series of 500 diabetics studied up to 1929 (Lawrence, 1929) a lowered renal threshold was noticed in about 2 per cent. of cases and no doubt was missed in others; and in my experience a raised renal threshold is much commoner.

Deviations from the usual threshold lead to difficulties in the treatment of diabetes. A low threshold in diabetes has two disadvantages. If the condition is not recognized there is a tendency to raise the insulin too high in an attempt to abolish glycosuria, and serious hypoglycaemia may be produced in a vain attempt to free the urine from sugar. Secondly, the heavy loss of sugar with only slight degrees of hyperglycaemia wastes so much sugar from the carbohydrate of the diet that weight and energy may be lost and serious ketosis occur on a carbohydrate diet which would be adequate were the threshold normal. The lowering of the threshold in pregnancy—very common—is the chief cause in my experience of serious ketosis in diabetic pregnancies, and can only be overcome by a very high carbohydrate intake. A high renal threshold, on the other hand, generally results in a diabetic being allowed to live with a constant and often considerable hyperglycaemia, and in this type of case such complications as arterial disease, retinitis, and neuritis are unusually common. It is not certain, however, whether these complications are directly due to this hyperglycaemia or are merely common in elderly diabetics, who so often have a rather high threshold.

Changes in the Individual's Threshold

Although statements are made in medical writings that variations occur in the threshold from time to time, the evidence is not convincing, and my experience leads me to believe that low or high thresholds persist unchanged for many years if not for life. This is certainly true of renal glycosuria in non-diabetics. The fact that the leak point is usually lower on the fall than on the rise of a blood-sugar curve does not invalidate this. Temporary changes, however, certainly occur in diabetics, and have happened in the following circumstances in my cases.

TEMPORARILY LOWERED THRESHOLD

Polyuria itself may produce this, perhaps by allowing insufficient time for reabsorption of glucose in the tubules. It is not uncommon to find a low threshold at the beginning of treatment in a patient with intense polyuria and after ten days the disappearance of glycosuria at a blood-sugar concentration practically the same as before. The most striking example I have seen occurred in a patient with only one kidney: in this case an initial blood sugar of 210 mg. per 100 c.cm. was accompanied by a total excretion of 212 grammes (8.5 per cent.) of sugar, whereas after a week of low carbohydrate diet only 2.5 grammes (0.2 per cent.) was excreted at a similar level in the blood, a threshold which has persisted for seven years and seems to be his permanent threshold.

Pregnancy often produces a temporary lowering of the threshold, and this was proved in twenty-nine (85 per cent.) out of thirty-four of my pregnant diabetics in whom the threshold was accurately determined. It is said to be equally common in normal women. The cause of this is obscure, but it is perhaps due to an effect of changed pituitary activity on their kidney function. It has long been known that phloridzin, which produces glycosuria by lowering the threshold, has more effect on pregnant than on non-pregnant women.

Posterior pituitary injections (pituitrin) certainly lowered the threshold in one of my diabetic cases, and Mann states that he has repeatedly noted this effect of pituitrin in blood-sugar experiments on psychotics (personal communication).

French writers (Castaigne and Chaumerliac, 1939) state that subacute glomerular nephritis may produce a lowering of the threshold. I have not noticed this.

In one case of severe *toxaemia* from a huge carbuncle I observed a temporary lowering of the threshold to under 100 mg. per 100 c.cm. and a rise to its usual level on recovery.

TEMPORARILY RAISED THRESHOLD

This may occur: (1) in *circulatory failure* with oliguria; (2) in *diabetic coma* with its curious kidney "block" in which the blood contains a large excess of sugar and ketone bodies, but these may not appear in the urine and even sodium chloride may be retained; and (3) in *nephrosclerosis* (ischaemic contracture), which gradually makes the kidney less permeable to sugar and the threshold progressively higher.

Summary and Conclusion

The study of the renal threshold in diabetics and normals with healthy renal function shows frequent upward and downward deviations from the accepted "normal" figure of some 170 mg. per 100 c.cm.

The conception of a "normal" threshold is false. There is an *average* renal threshold, just as there is an average blood pressure, and the many deviations from it should be looked upon as physiological—a matter of individual idiosyncrasy, and of no pathological significance.

High and low thresholds are frequent and usually persist at the same level throughout life. A few factors

outlined above affect the threshold temporarily or even permanently.

The stigma of something abnormal (and hence pathological) that has been imputed to a high or low renal threshold should be removed.

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PREVENTION OF THROAT INFECTION

BY

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AND

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The toll in time and fitness levied by repeated epidemics of colds, sore throats, and inflamed tonsils arising among war workers is well known. When people are crowded together "droplet" infection is of course especially liable to occur.

Thymol as a Mouth-wash

During the last war, after investigating the action of various antiseptics on the orgapisms occurring in the mouth and tonsils, it was suggested by one of us (Goodrich, 1917a) that a solution of thymol was an excellent mouth-wash. This opinion has since been confirmed not only by our own daily experience but by that of many others. A distinguished biologist told us recently that he had used a saturated solution of thymol as a gargle as well as a mouth-wash ever since 1917, and to this attributed the fact that he had since had no throat infection, not even a common cold. Many people prefer to dilute the solution. No doubt there is considerable individuality with regard to the taste of thymol, some people finding it rather peppery and inclined to be irritating if strong. It should be remembered, too, that the solubility rises rapidly with the temperature, so that a really cold solution (0.05 to 0.06 per cent.) is much weaker than one saturated in a warm room.

For popular use the solution is best made by keeping the thymol in a suitable bottle filled with water; if in small crystals these may be enclosed in muslin to prevent their escape when the solution is poured off. The bottle may be refilled with cold* water as the solution is used, and one can rely on having a saturated solution after a short time. When required as a mouth-wash or gargle it may be added to water (preferably warm) until the taste is right for the individual but not strong enough to "bite the tongue," as children say. The thymol is so slightly soluble that an ounce, costing a few pence, will make about nine gallons of solution; the price is therefore negligible. The saturated solution is also very useful for disinfecting rooms and articles in them, and especially for spraying windows and mosquito nets in the Tropics.

It has elsewhere been pointed out (Goodrich, 1917b) that although the addition of glycerin enables much more thymol to dissolve in water there is no corresponding increase of antiseptic power, and that therefore the use of glycerin in this way is a great waste of a substance required for munitions. This criticism does not apply to the use of glycerin as a demulcent in throat paints, but only to mixtures intended to be diluted before being used, in which case, therefore, the glycerin has practically no action except the reduction of the antiseptic properties of the thymol.

* Hot water must not be added to the solid thymol, since it melts at 51.5° C.

The Case for Oral Hygiene

It may perhaps be well to repeat here that in every mouth left undisturbed for some hours—for example, during sleep—a varying amount of white substance grows on the tongue and other surfaces and accumulates round the teeth. This consists chiefly of the thread-like plant *Leptothrix*, in the meshes of which may be numerous micrococci and other organisms and cells. The leptothrix, if not removed, will grow rapidly and calcify, passing from the so-called soft tartar ("materia alba" of Leeuwenhoek) to the well-known hard tartar. Goodrich and Moseley (1916) also recorded how frequently organisms from the mouth are to be found growing in the crypts or pockets of the tonsils. These folds of epithelium, when filled with calcified colonies of leptothrix as well as numerous bacteria, show up as white spots on the surface of the tonsil (so-called ulcerated throat). This is the unhealthy condition that must be cleaned up: if neglected the whole tonsil may become much hypertrophied, whitish, and thoroughly septic, with organisms and pus oozing from the surface as in some of the excised tonsils we have examined in the laboratory.

All this points to the advisability of keeping the throat and tonsils, as well as the mouth, clean. It seems strange that some people who would never think of missing their daily bath resent giving, by way of oral hygiene, more than a perfunctory rub to their teeth with a brush (possibly teeming with bacteria); and yet with a suitable antiseptic at hand it is so easy to sterilize a soft brush and to kill and remove most of the organisms trying to establish themselves in the mouth or throat. It would seem that the mere mechanical action in gargling must be of use in helping to empty the tonsil pockets so that the antiseptic can wash away the contents. Most children will take to gargling, as to the use of a toothbrush, if they have an inkling that their parents and other grown-ups use these hygienic measures, which really take so little time. Cleanliness can, of course, be gauged by the absence of tartar from the teeth and the healthy appearance of tongue and tonsils. Usually nothing more will be required to ensure reasonable freedom from infection.

One has, however, if necessary, a further line of defence in the practice of painting the throat and tonsils: here again the mechanical action doubtless helps to remove organisms lodged in the pockets or multiplying on the mucous surface of the throat. In the standard iodine-and-glycerin mixture used as a paint one can well afford to have the powerful antiseptic properties of iodine reduced (see below), and the glycerin ensures that the organisms are submitted to the antiseptic for a longer time than in mere rinsing.

In the report published by the Ministry of Health (Straker, Hill, and Lovell, 1939) on the bacteria of the nasopharynx surprisingly high percentages of meningococci, haemolytic streptococci, and other pathogenic organisms are recorded from some groups of the population. It is very much to be hoped that these investigations will be continued and some correlation attempted with the general hygienic conditions of the mouths and throats tested. Perhaps the results would throw some light on a fact for which the authors seem unable to account at present—namely, that in groups with similar occupations consider-

ably smaller percentages of women than men were found to be carriers. We can find only one reference in the report to the effect of cleanliness of the throats tested: on page 55, referring to the tonsils of nine schoolboys, it is stated: "From six of these cases the Type 19 streptococcus was isolated, while the remaining three gave completely sterile swabs—probably as a result of recent gargling or throat-painting."

Antiseptics were in some disrepute at the end of the last war, in great part owing to the conflicting results obtained by those attempting to eliminate meningococcus carriers. Now that it is known that carriers are so numerous among the general population and that the form of meningococcus carried (Group II) is comparatively harmless, the Ministry of Health (1940) discourages the search for carriers and states in its Memorandum that local treatment of the nasopharynx is probably useless. We hope, however, that contacts and carriers are not discouraged from using such simple hygienic measures as advocated here in addition to the fresh air and exercise prescribed. Infection, as stated on page 10 of the Ministry's Memorandum, appears to be through the nose and mouth, and it must surely be an advantage for individuals to take any steps likely to clear away infecting bacteria while they are still only on the surface of the epithelium.

From our personal experience of "gargling fatigues" we know that the men generally appreciate being encouraged to keep their mouths and throats clean—so much so, in fact, that they sometimes make solutions of anything available, such as common salt or vinegar, to use at other than the official times.

There seems little doubt that it is sometimes beneficial to change temporarily the antiseptic used as a throat- or mouth-wash, and the usual solutions of potassium permanganate or even boric acid may thus come in useful as a change for a day or two from more powerful antiseptics such as thymol and iodine.

Conclusion

It may be of interest to add here the results* of recently testing iodine solutions to discover one with the same germicidal effect *in vitro* as thymol. The method was that devised by one of us in 1917. A thin cover-slip film of an emulsion of the bacteria to be tested (in this case *B. coli*) was dried and immediately placed in the prepared solutions for the required time, then rinsed and pressed on to the medium (MacConkey's bile-salt lactose-agar) and incubated at about 34° C. for twenty-two hours. Provided that great care is taken in making the films and using aseptic methods throughout, the results obtained are surprisingly consistent.

Dried control films of coliform bacilli submitted only to water gave large growths always, whereas in thymol solution saturated at 15° C. (0.077 per cent.) sterilization was effected in under thirty seconds. Iodine so dilute as 0.01 per cent. gave similar results. This is only 1/100 the strength of Lugol's solution as used in laboratories, yet its efficacy is undoubted, and suggests that even the small amount of iodine contained in some lozenges may have a useful action. In water alone iodine dissolves only to the extent of 0.017 per cent. at 10° C. A convenient way to keep it for gargling is to make this saturated solution and dilute it with warm water as required.

* These experiments were made in the Department of Zoology, University Museum, Oxford, and our thanks are due to Professor E. S. Goodrich for much helpful criticism.

Summary

The occurrence of harmful organisms in the mouth and throat is discussed. Since they multiply on the surface of the tissues the problem of getting rid of them is similar to that of killing them *in vitro*. For this purpose methods are described and the use of antiseptics is recommended.

The advantages of thymol as an antiseptic or disinfectant are its almost negligible cost and its convenience in use.

In overcrowding, where it is impossible to increase adequately the cubic space per person, it would seem specially important to enforce "gargling fatigues" and so help to guard against "droplet" infection.

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A CASE OF CONGENITAL COMPLETE HEART-BLOCK

THE EFFECT OF ATROPINE

BY

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That this condition is comparatively rare is evinced by the fact that in 1932 Aitken collected only thirty-nine cases. By 1934 Campbell and Suzman were able to collect fifty-three. It has been suggested that the reason for the increase is that the more frequent use of graphic registration is leading to the recognition of a greater proportion of cases.

Yater (1929) laid down the postulates for acceptance of the diagnosis as (1) recognition in early life; (2) absence of previous history of other possible cause of heart-block such as diphtheria, rheumatism, or congenital syphilis; and (3) demonstration by the electrocardiogram. The presence of congenital heart disease also lends weight to the diagnosis.

Case Report

A child aged 2 was admitted to Kilmarnock Infirmary on March 1, 1939, as a case of suspected meningitis or infantile convulsions. She had been ill for two days. On admission her temperature was 101°, pulse 42, and respirations 30. There was very slight nuchal resistance and Kernig's sign was negative, no history of ear disease, and no sign of cerebral compression. Lumbar puncture gave a clear fluid (normal on examination) under slight pressure (140 mm.—the child crying vigorously). The heart was enlarged laterally in both directions, the transverse diameter being four inches; there was also a definite bulging of the praecordium and a thrill in the fourth left intercostal space just inside the nipple line, and a harsh systolic murmur was heard over the whole cardiac area, most pronounced in the region of the thrill. No other abnormality was detected: no dyspnoea, cyanosis, or clubbing of the fingers was present. The temperature fell to normal in twenty-four hours, and the child remained well during the remainder of her stay in hospital. She was otherwise healthy and well developed; her Wassermann reaction was negative.

Previous History.—Normal full-time delivery attended by a midwife. The child was first seen by a doctor when 18 months old, suffering from symptoms similar to the present illness, and was sent to another hospital, where the bradycardia was noted and where she made an uneventful recovery. Since then till her present illness she had been perfectly well except for

"fainting turns," which unfortunately her parents were unable to describe satisfactorily, but which might have been Stokes-Adams's syndrome; she had also had two of these attacks previously. Both of her parents and her elder brother are healthy and have normal pulse rates.

Radiological examination revealed enlargement of the heart due to congenital abnormality; oblique views and barium swallow could not be achieved owing to the restlessness of the child.

Electrocardiograms were taken before and after the injection of atropine, and are reproduced in Figs. 1 and 2. Later the effect of 1/100 grain of atropine sulphate was

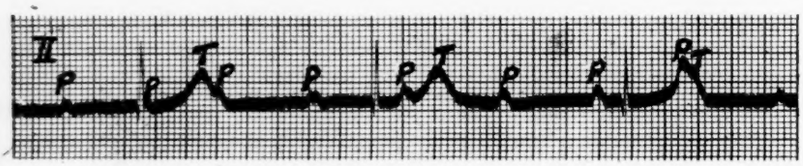

FIG. 1.—Electrocardiogram taken before the injection of atropine. Auricular rate, 115 per minute; ventricular rate, 38 per minute; complete block.

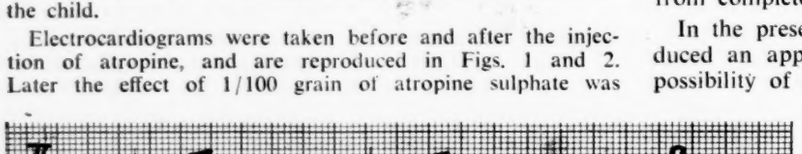

FIG. 2.—Electrocardiogram taken half an hour after the injection of 1/200 grain of atropine. Auricular rate, 120 per minute; ventricular rate, 40 per minute; apparent partial block of 3:1 ratio.

investigated, with the following results. First and foremost was the failure to break the complete block: the rates of the individual chambers at the different intervals were as follows:

Before atropine	Auricles	111	per minute
	Ventricles	38	" "
30 minutes after atropine	Auricles	158	" "
	Ventricles	40	" "
60 " " "	Auricles	131	" "
	Ventricles	36	" "

On November 4, 1939, the child was re-examined; the electrocardiogram still showed a complete block, the auricular rate being 124 per minute and the ventricular rate 36. Since the previous examination the parents, now instructed what to look for, were able to describe several Stokes-Adams's attacks, lasting a few minutes at the most. Otherwise the child had been well and had played about normally.

Discussion

In view of the clinical findings, the compliance with Yater's postulates, the radiological report, and the electrocardiograms, this is undoubtedly a case of congenital complete heart-block, associated with probable patent interventricular septum and Stokes-Adams's attacks.

Regarding the effect of atropine on heart-block, Aitken (1932) discusses possible changes of rhythm from complete to partial heart-block by vagal paralysis; in the twelve cases in her series where atropine was given no such change of rhythm occurred. On the other hand, Allan (1928) describes a case of partial heart-block which was temporarily abolished following the administration of atropine, but at times this abolition was preceded by a transient complete block owing to the initial stimulation of the vagus; in this case there was no anatomical severance of the bundle of His. Other authors describe change of rhythm apart from the administration of atropine: Smith (1921) describes a case of heart-block complete except during forced expiration, and Calandre (1921) published a case in which there was complete block except when the patient was in absolute repose; Bass (1918) quotes a case in which there were short intervals showing normal QRS complexes preceded by normal P waves; Campbell and Suzman (1934) state that in their opinion the block always remains complete even in a case showing at times short records of 2:1 block. The last-named authors believe that this was most likely due to the auricular rate being almost exactly twice the ventricular rate: no graphic record of sudden change from complete to partial block has been published.

In the present case the first injection of atropine produced an apparent reduction to 3:1 partial block; the possibility of its having been caused by paralysis of the vagus in the presence of a few remaining fibres of the bundle of His giving normal sinus rhythm was taken into account. If this were the case, then the second and larger dose of atropine should certainly have had the same effect. Such was not the case, the auriculo-ventricular ratio rising to nearly 4:1. It would therefore appear that, as with Campbell and Suzman (1934), the apparent partial block is due to the coincidence of the auriculo-ventricular ratio being exactly 3:1 for the time being and the P wave coming in at its normal interval before the QRS complex.

It is of interest to note that the effect of 1/100 grain of atropine was to raise the auricular rate out of all proportion to the rise in the ventricular rate, and also that the latter fell much more quickly to its original rate than the auricular. This also agrees with the findings of Campbell and Suzman.

The above case is also one in which atropine affected the ventricular rate in spite of the complete block cutting off action through nerve control. On another occasion in this patient after the injection of 3 minims of adrenaline the ventricular rate rose to 48, the block still remaining complete.

Summary

A case is described of congenital complete heart-block in a child aged 2, associated with patent interventricular septum and attacks of Stokes-Adams's syndrome.

Electrocardiograms under normal conditions and after the injection of atropine are reproduced. The results of graphic investigation are given, and from these figures is discussed the possibility of the reduction of complete to partial block; the balance of opinion is against this possibility.

The disproportionate action of atropine on the dissociated auricular and ventricular rates is noted, and also the much quicker return of the ventricular rate to its original figure.

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The King Edward's Hospital Fund for London has decided that the annual distribution for 1939 shall be made up to the usual total of £300,000. Part of this distribution was held up on account of the war, but now that hospitals have resumed much of their ordinary work they are dependent on the normal sources of income: the supplementary grants from the King's Fund and increased subscriptions and donations from the public. The area of the King's Fund is to be extended from eleven miles round St. Paul's to the Metropolitan Police District; most of the hospitals in Greater London will thus come within its range.

Clinical Memoranda

A Simple Method of Localizing Foreign Bodies in the Limbs

From April, 1916, till the end of the last war I was in charge of No. 2 Mobile *X*-ray Unit. For the first eighteen months or more that I was working in France and Belgium foreign bodies were localized by taking radiographs in the antero-posterior and lateral planes (when this was possible) and, if not, by relying on stereoscopic skiagrams. The former method was at best unreliable, and the latter required great care and skilled technique to produce satisfactory results.

I do not know who invented the method to be described, but I believe it was called the parallax. To apply it all that was needed was a table fitted with a movable tube underneath and screened by a rectangular diaphragm, and a metal instrument shaped like a silver catheter, hollow throughout and with a rigid wire running through it. At the tip the wire was armed with a tiny pad to absorb an indelible ink and the other end of the wire was flattened for thumb pressure. A spring held the inked pad within the tube, and it could be made to protrude by pressure on the opposite end.

The limb was arranged most carefully to lie in the true antero-posterior position. The foreign body was then located with the diaphragm, which was eventually cut down to the minimum and centred on the foreign body. The opaque marker was slipped under the limb, recognized through the diaphragm, and placed in line with the foreign body. Pressure on the distal end marked the position on the skin. The marker was then introduced in front of the limb and the skin marked. All that was then necessary was to find the depth level.

The principle involved to determine this is that foreign bodies situated at the same distance from the *x*-ray tube will have shadows shown on the screen that move at exactly the same rate when the tube is moved.

TECHNIQUE

The tube is already centred on the foreign body. The diaphragm is opened to give a long slit of light on the screen in the axis of the limb. It is opened broadly only enough to reveal the point of a straight metal rod held by the operator against the outer side of the limb. While this is done the tube is moved slowly up and down on the long axis of the limb. The foreign body and the pointer will be found to travel at unequal speeds on the screen and reach the ends of the illuminated slit at different times. The position of the pointer should be adjusted so that its speed equals that of the foreign body. When the pointer and the foreign body reach each end of the slit together the *exact* level of the foreign body has been found. Keeping the pointer fixed, the lights are switched on and a cross made on the skin with an indelible pencil. The marks made anteriorly and posteriorly on the skin may now well be reinforced with circles by the pencil.

When accustomed to the technique the method is rapid, accurate, and also economical, as, except in the case of a fracture, there is no need to take a photograph. The surgeons for whom I worked highly approved of the method, and practically all the foreign bodies were successfully removed.

LEONARD LEY, M.B., B.Ch.,
One-time Captain R.A.M.C.

Great Yarmouth.

Reviews

ANOXIA

L'Anoxémie : Ses Effets ; Son Traitement ; L'Oxygénothérapie. By Professor Léon Binet, Madeleine Bochet and M. V. Strumza. (Pp. 96 ; 26 illustrations. 50.60.) Paris: Masson et Cie. 1939.

Professor Léon Binet is regarded as the leading authority in France on the subject of anoxia. His wide experience covers not only cases suffering from gas poisoning in the war of 1914–18 but also the various types of anoxia due to the usual pulmonary and cardiac diseases. Moreover, with his colleagues he has carried out numerous researches on the physiological and pathological aspects. His object in publishing this monograph with his assistants is not to sift the details from the bibliography but to record the results of their own researches. There are few references in the book, but mention is made of the previous works which give references—namely, Campbell and Poulton's *Oxygen and Carbon Dioxide Therapy* and Dautrebande's *Oxygénothérapie et Carbothérapie.*

Many of Professor Binet's experiments were performed on chloralosed dogs breathing mixtures of gases with oxygen at low percentage under normal barometric pressure. With this technique it is found that the fall of alkaline reserve is not the cause of respiratory arrest, and that artificial respiration with carbon-dioxide-enriched mixtures is, for resuscitation, not more efficient than with ordinary air ; and further injection of sodium bicarbonate is valueless. However, the use of the anaesthetic rather handicaps the application of these experimental results to patients suffering from anoxia. The adverse effects upon the heart are indicated, and in some cases it is found that the heart ceases beating before the movements of respiration stop. Anoxia, it is stated, also causes an active dilatation of the pial vessels, while the results of biochemical studies of blood and tissue glutathione and of blood ammonia are recorded.

As regards resistance of anaesthetized dogs to very low oxygen pressure, morphine and scopolamine give adverse effects. Caffeine, camphor, and lobeline do not help much, but compounds of ephedrine and also benzedrine in certain doses definitely increase resistance. The well-known dangers of breathing oxygen at a pressure much above 60 per cent. of an atmosphere for prolonged periods are illustrated from experiments with mice, pigeons, and guinea-pigs. The main changes include congestion, thickening of the alveolar walls of the lungs, and the presence of eosinophils therein.

The surgical and medical indications for oxygen therapy are given, and Professor Binet's choice of therapeutical apparatus includes a modified tent and a transparent bucco-nasal mask open at the top and covering the face. With 8 litres of oxygen per minute entering the lower part of the mask the oxygen pressure in the lung alveoli of the patients is kept at about 60 per cent. of an atmosphere. With such a mask there are no mechanical complications such as valves or springs, which, however easy in action, always impede and embarrass the respiration of very weak patients ; and there is no irritating current of oxygen in the nasal passages. For patients with suspended respiration a portable and modified Woillez apparatus is used to perform artificial respiration. Also Professor Binet uses a simple thoracic band or girdle which exerts compression and decompression and ensures as well exact synchronization between inspiration and arrival of oxygen at an inhalation mask.

The illustrations are good and the treatise gives a clear account of the authors' own experiences. Our main criticism, which applies to many other articles on this subject, is that details of the final results of treatment of individual cases are wanting.

EXPERIMENTAL AND COMPARATIVE EMBRYOLOGY

Form and Causality in Early Development. By Albert M. Dalcq, professor of human anatomy and embryology at the University of Brussels. (Pp. 198; 64 figures. 12s. 6d. net.) Cambridge: At the University Press.

This is an excellent presentation of recent work on experimental and comparative embryology, which is supplemented by a record of much of the author's own work, and comments upon the results and ideas arising therefrom. Professor Dalcq demonstrates the essential unity in the modes of development and organization of chordate, prochordate, and invertebrate development, more especially with regard to the manner in which corresponding presumptive territories in the early gastrular and blastular stages are capable of being mapped out by means of vital-staining methods, combined with observations made on complete ova and reconstructions of serial sections. Numerous fundamental problems are discussed with reference to the interpretation of observations upon conditions such as organogenesis; the kinematic aspect of embryogenic processes; the influence of physicochemical factors; regional organization of the unfertilized egg, and of the ovum during and after cleavage; presumptive areas; induction; polarity; "individuation"; fields of influence; axial gradients and regulation.

From the standpoints of human embryology, the scientific study of heredity, and pathology many would welcome a further consideration of the bearing that these more recent observations have upon some of the older conceptions—for example, the generally accepted idea that the raising of the lateral borders of the medullary plate which precedes the closure of the neural canal is produced by a coincident proliferation of the paraxial mesoderm rather than the change in form of the neural cells. Moreover, although most embryologists would agree that a change occurs in the form of the neural cells which are concerned in the outgrowth of the neural crests, and that this may in part be responsible for the outgrowth, it is certain that the process is also accompanied by proliferation of these cells and that other factors may take part in the movement. Such phrases as "Cell groups endowed with a definite presumptive value migrate in a well-ordered troop towards their precise aim" are likely to be misinterpreted, and what is required is not only the demonstration of the movements but also a knowledge of the factors which initiate and control such movements. Further, it is obvious that the phenomena of life and the well-established facts of evolution and heredity cannot be fully explained by physicochemical factors alone, and the time seems ripe for a concerted and co-operative effort towards a fuller elucidation of such problems as the origin and control of proliferative malignant tumours, and a better understanding of the exact mode of transmission of hereditary characters and the influence of heredity on ontogenetic and evolutionary processes.

Professor Dalcq's book brings together in a brief survey of the subject a very large amount of information, which otherwise can only be obtained by consulting original treatises; it stimulates imagination, and is an admirable incentive to further work.

CONSTITUTION AND THE SPECIFIC FEVERS

Rôle de la Constitution dans les Maladies Infectieuses des Enfants. By Hanna Hirszfeld. Preface by Professor Robert Debré. (Pp. 152; 20 figures. $0.70.) Paris: Masson et Cie. 1939.

From the university paediatric clinic and State institute of hygiene in Warsaw Dr. Hanna Hirszfeld has produced a most interesting monograph on the role of the constitution in the infectious diseases of children. Put briefly this authority opposes the old view that the infectious agent always provokes the disease once it has become disseminated among a relatively susceptible population, by the modern notion which attaches much less importance to the question of infection and much more to the resistance of the host, with the claim that such resistance is largely a matter of inherited immunity. Dr. Hirszfeld's husband, Professor Ludwik Hirszfeld, has been responsible for valuable pioneer work on the inheritance of blood groups, and much of the evidence on the inheritance of immunity is bound up with a study of the blood groups. Statistical considerations of mortality and morbidity figures in relation to age, sex, and blood groups, with studies of familial infections, are fascinatingly set out. Dr. Hirszfeld raises problems of the highest importance, and her conclusions, if accepted and confirmed, would affect in due course the whole public health outlook and policy as regards the control of infectious diseases. It is sincerely hoped that the destruction of Warsaw spared the author of this monograph to work elsewhere on her important subject.

LARYNGEAL CANCER

Cancer of the Larynx. By Chevalier Jackson, M.D., Sc.D., LL.D., F.A.C.S., and Chevalier L. Jackson, A.B., M.D., M.Sc.(Med.), F.A.C.S. (Pp. 310; 189 illustrations on 116 figures, and 5 plates in colour. 40s. net.) Philadelphia and London: W. B. Saunders Company. 1939.

In recent years a series of books has been issued from the Jackson Clinic in Philadelphia, and the last of these is entitled *Cancer of the Larynx.* The arrangement of this book is peculiar, for it is divided into three parts, of which Part II is in many respects a repetition of Part I but written from a different aspect; the reason given being that diagnosis and treatment, or "what to do and how to do it," are of such practical importance that Part I should be devoted to them. Part II is a concession to the more reflective and scientific reader, and in it such matters as aetiology, prophylaxis, and results are considered; while Part III is a historical summary provided largely in the form of tables and paragraphs dated in chronological sequence, without any effort to trace the evolution of our knowledge of this disease. That the book should be presented in this form, which from the literary standpoint is a mere jumble, shows that the Jacksons have but a low opinion of the intelligence of their prospective readers, though doubtless they had no intention of revealing this.

In the matter of diagnosis enormous importance is attached to biopsy, and the endoscopic method of examination by which this is done is described at great length. All this and much more has already appeared in other books by the same authors, and it is not until a method of excising the larynx by what is called "narrowfield technic" is reached that something which is not merely repetitive is encountered. The authors do not say what results have been obtained from following this technique, but it appears to embrace every fault and hazard which the great masters of the past have endeavoured to eliminate from this operation. The "technic of widefield

laryngectomy" is also described, but the authors seem to be little interested in the ways of operating based on sound surgical principles, nor do the complications and methods of repair sometimes required later receive anything but scant attention. Lateral pharyngotomy is dismissed in a chapter of ten lines, and it appears that any case unsuitable for anything except a most limited operation is condemned to irradiation. It is even recommended that lymphatic glands should always be treated by irradiation no matter how slightly involved. This pusillanimous attitude even goes to the extent of including an illustration on page 156, where a lymphatic gland is seen exposed in the anterior triangle of the neck, and into the substance "radium gold implants" are being inserted.

The book is beautifully illustrated and contains several fine coloured plates. No doubt it faithfully presents the practice at the Jackson Clinic, where surgery is confined to cases of limited intrinsic cancer, but it quite fails to give an adequate account of what can be done for patients with laryngeal cancer, many of whom present themselves with the disease in a more advanced form or in situations unsuitable for the timid surgery advocated. There is an accurate bibliography, in which some of the older references copied by one writer from another have been carefully verified, but it has not been brought up to date. The most depressing feature of the book, however, is the failure to give credit to the work of those surgeons by whose efforts the present position has been reached. The most notable of these are Gluck and Soerensen, who receive the barest mention, and Trotter, who is entirely ignored even in the bibliography.

BIOCHEMISTRY

Fundamentals of Biochemistry in Relation to Human Physiology. By T. R. Parsons, M.A., B.Sc. Sixth edition. (Pp. 462. 10s. 6d. net.) Cambridge: W. Heffer and Sons, Ltd.

Micro-diffusion Analysis and Volumetric Error. By Edward J. Conway, M.B., D.Sc. (Pp. 306; 49 figures. 25s. net.) London: Crosby Lockwood and Son.

To have reached a sixth edition in the space of sixteen years indicates a success no greater than that which was predicted for Mr. Parsons's book when it was originally published. The intervening period has seen practically only those changes dictated by the necessity for keeping the book right up to date. Even the original set of chapter headings has been retained without alteration until this occasion, when the volume has gained an entire chapter. This marks, as the author puts it, "a turning point in its history." Sterols and steroids can no longer be denied the dignity of a chapter to themselves. Mr. Parsons has in exceptional degree the art of simplifying while at the same time keeping to accurately scientific presentation. He possesses a style which makes for easy reading, and in which homely illustration and analogy are seen to advantage. For instance, to point out in relation to the ω-oxidation of fatty acid chains that the subsequent oxidation is "dangerously like burning a candle at both ends" is to use a simile that could not be bettered—except perhaps by the omission of the word "dangerously." The new chapter fully maintains the author's reputation for rendering complex subjects easy of assimilation, and also illustrates in interesting fashion the type of minute and subtle changes in chemical molecules which might govern sex differences. As introductory reading the book is excellent.

A few years ago Professor Conway introduced into analytical practice the principle of micro-diffusion, in conjunction with a simple and robust standard apparatus. Both principle and apparatus have been found to be of wide application, particularly for serial analyses of certain types. These include determinations of ammonia, urea, blood alkali reserve, chloride, and bromide. The main object of the book is the description of the various applications of the micro-diffusion method. Part I is devoted to the standard "unit" and accessory apparatus, with an account of the general principles governing their use, while Part II furnishes the detailed analytical technique. Throughout both these parts the question of attainable accuracy is kept continually in the foreground, but it is in Part III that the important subject of volumetric error is treated as a theme in itself. It should prove of great interest to all scientific workers who may require to use volumetric technique, and even those who have no aptitude for mathematics can profit from a study of the questions at issue as well as the general conclusions. An appendix deals with the factors governing urea excretion, and describes the use of the simple "normality ratio" as a practical means of estimating renal function. Its theoretical counterpart, embodied in the author's diffusion-pressure formula, is shown to have a sounder basis than the better-known "clearance" formulae.

Notes on Books

A tenth edition of *Bell's Sale of Food and Drugs* has been made necessary by the upheaval in this branch of public health law created by the Food and Drugs Act, 1938. This Act has largely codified the laws governing the purity of food, but it also makes many important amendments in the law, and contains sections relating to a number of subjects—for instance, unsound food, food-poisoning, the sale of horseflesh, and the cleansing of shellfish—which were previously to be found in the Public Health Acts. The scope of the book has therefore been much enlarged. It is not unhandy but it is very complete; and besides the annotated text of the statutes and regulations—numerous and varied—which govern its subject, it contains a bibliography of official publications, a collection of circulars and memoranda which have been sent by the Ministry of Health to local authorities, and some useful chemical notes on some of the commoner forms of adulteration. The publishers are Butterworth and Co., and the price is 15s.

In our review of the first edition of the *Textbook of General Surgery*, by WARREN H. COLE and ROBERT ELMAN (January 16, 1937), we commented that in an otherwise excellent survey of the field of modern surgical practice the most disappointing section was that relating to fractures. Some improvement of this section is noticeable in the second edition (New York and London: D. Appleton-Century Company; 40s.). The general arrangement of the text has not been altered, but new advances have been included and there has been some deletion of relatively unimportant material. Reference is made in this edition to the prevention and treatment of bleeding in jaundice by vitamin K, and numerous applications of sulphanilamide therapy are described. The account of the histamine flare test is given for determining amputation level as indicated by the collateral circulation. "Flare" is written as "glare" in one place, but proof-correcting has been better than in the first edition. This is a sound work on modern surgical practice which can be safely recommended as a guide both to students and practitioners.

Home Nursing for Everybody, by DORIS E. WEBB (Faber and Faber; 2s. 6d.) is a small book in simple language for those who have had no training in nursing. The book is well written and attains its object. It should be of service at a time when every household must be prepared to deal with sickness and emergency without trained assistance.

Preparations and Appliances

AN IMPROVED CUT-OUT CONTROL FOR ABSORBERS IN ANAESTHESIA

Dr. F. BARNETT MALLINSON, honorary anaesthetist, Princess Beatrice, Royal Waterloo, and Woolwich Memorial Hospitals, writes:

The advantages of carbon dioxide absorption in anaesthesia are too well known nowadays to need description in introducing apparatus designed to improve and facilitate its accomplishment.

Of the two modern methods of absorbing carbon dioxide—the "circle" system and the "to-and-fro" method—I

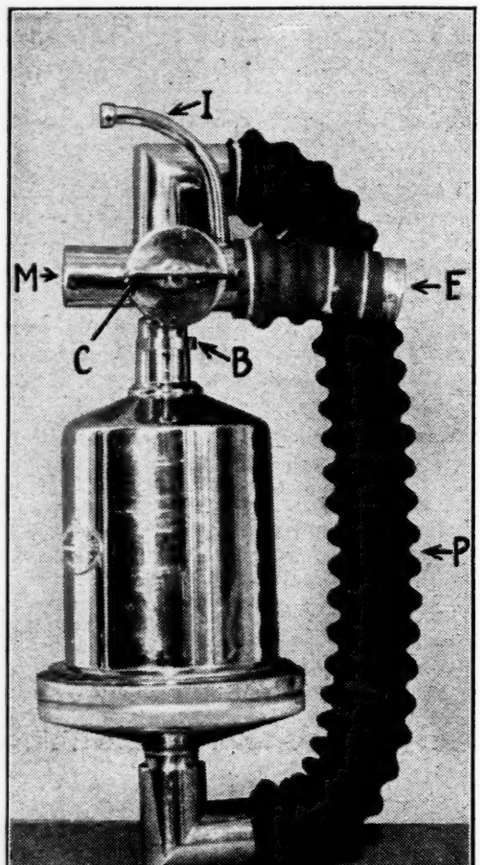

FIG. 1

prefer the advantages attaching to the latter; and therefore the apparatus described below has been designed to obviate one of its main disadvantages—namely, the difficulty of attaining a satisfactory by-pass mechanism. The chief advantage of the "circle" absorber is that it is operated at a distance from the patient. On the other hand, it is a heavier and more cumbersome apparatus, being a valve-operated machine. Furthermore, it is more expensive, though I understand that the most up-to-date example costs only about £27. With the "to-and-fro" single-phase type the only apparatus required is an efficient canister, which has to be close to the face-piece, of course, but a sufficiently flexible junction to obviate face-piece drag can be made with two inches of wide-bore hose: dead space is not appreciably increased.

The usual type of by-pass with two controls—one to divert expiration at the top of the canister and another to divert the return flow—is clumsy, both controls having to be operated together and partial diversion of gases being impossible. Another type has a control at the top only. This allows by-passed gases to eddy into the canister on the return journey, vitiating the effect of the cut-out. These difficulties have been successfully overcome with the cut-out control illustrated. The gases from the face-piece (F) pass across the top of the canister when it is out of circuit, and *directly* through it when the canister is "cut-in" by the single control (C). Dead space between the face-piece and the canister is virtually *nil*. The gases pass back to the control mechanism via an external rubber pipe (P), and may then either pass back to a machine such as the McKesson (M) or pass direct to a rebreathing bag. In the latter case the inlet (I), provided with a stopcock for use when the inlet is not required, is employed to introduce the fresh gases. The control will divert any desired proportion of the gases through the absorber, and when set to cut the latter out completely it can be easily removed for recharging, etc., by detaching it from the bayonet catch (B). Internal resistance is satisfactorily low.

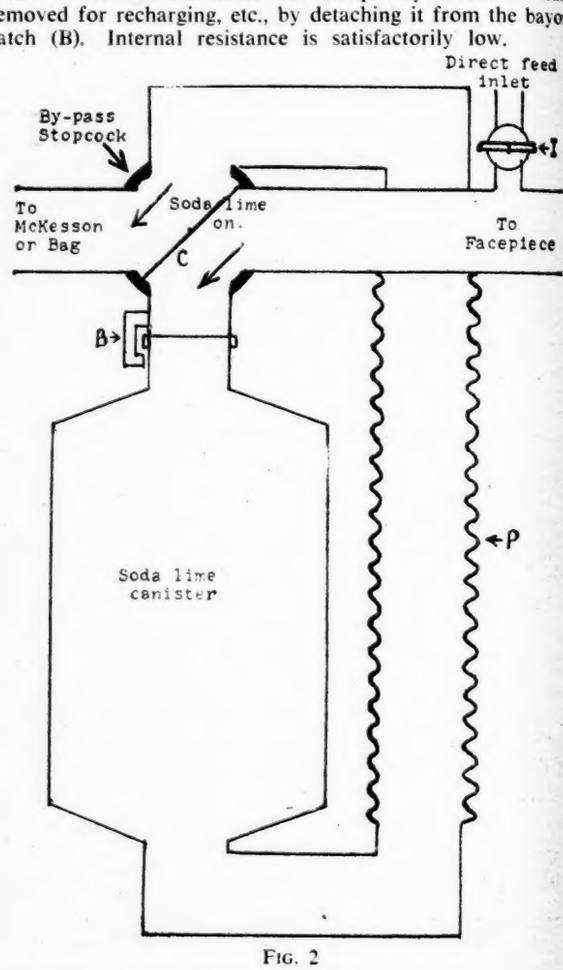

FIG. 2

This simple control mechanism can be fitted to any good-type canister, a McKesson being the one favoured by myself, and its cost is negligible. The apparatus has been in constant use in a Sector Hospital for the last six months and is entirely satisfactory: it was made for me by Medical and Industrial Equipment, Ltd., of 12, New Cavendish Street, London, W.1.

SYNTHETIC ANTI-MALARIAL DRUGS

"Quinacrine" and "praequine" are two synthetic anti-malarial drugs manufactured in Great Britain by Messrs. May and Baker. This firm has been licensed to work the enemy patents of the I.G. Farbenindustrie Aktiengesellschaft, who originally prepared these drugs and marketed them under the proprietary names of atebrin and plasmoquine. Messrs. May and Baker are to be congratulated on having achieved these difficult syntheses.

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THE ACTION OF SULPHANILAMIDE

We have referred repeatedly in these columns during the past five years to observations bearing on the mode of action of sulphonamide compounds. No treatment can be perfected until it is understood, nor can it rapidly be improved and extended unless the underlying process can be analysed and all the factors governing it are known. There need therefore be no apology for constant recurrence to an aspect of this matter which superficially may seem to be of only academic interest. The problem as it stands to-day has been simplified by the disproof of several passing ideas—for example, it is now known that sulphanilamide does not neutralize bacterial toxins, and stimulates neither leucocytic activity nor antibody formation. The main question is whether it acts at all as such directly on the bacterial cell, and if so how. Such an action is denied by two schools of thought—the German, headed by Domagk himself, which maintains an attitude of almost reverent agnosticism, as if systemic chemotherapy of any kind involved some mystery which cannot be probed by ordinary methods; and the French, represented by Levaditi and Mayer, who continue to postulate conversion in the body into some more actively bactericidal compound. Among those who are content with a more simple explanation the idea has been growing that sulphanilamide acts directly on bacteria by way of some interference with their metabolism; whether this constitutes antiseptic action in the ordinary sense is a matter of opinion.

What appears to be a complete solution of this problem has now emerged from the work of Dr. Paul Fildes and his collaborators, who have long been engaged on studies of bacterial metabolism in culture media every constituent of which is synthetic and therefore exactly known. They were thus in a unique position to attack any problem the clue to which lay in the nutrition of the bacterial cell. D. D. Woods[1] had already been approaching it by way of a search for substances which would antagonize the bacteriostatic action of sulphanilamide *in vitro*—that is, would furnish the bacterial cell with something of which sulphanilamide deprived it—when T. C. Stamp[2] made the observation that an extract of streptococci had this effect; a factor with this property has also been extracted by H. N. Green[3] from *Br. abortus*. Woods found that this factor could be obtained from yeast, a ready and prolific source which enabled him to work with it on a large scale and to pursue attempts to purify and identify it. The progress of these attempts was controlled by titrating the capacity of the product to neutralize the action of sulphanilamide on *Str. pyogenes* in culture. Step by step the chemical constitution of the purified substance was deduced, and the conclusion eventually reached is that this substance is *p*-aminobenzoic acid. Almost certain proof is afforded by the fact that pure *p*-aminobenzoic acid has the same anti-sulphanilamide activity, and there is the same relation between its concentration and the concentration of sulphanilamide which it will neutralize. In somewhat greater amount it also neutralizes the anti-bacterial action of sulphapyridine.

In the interpretation of these facts it is assumed that *p*-aminobenzoic acid is essential for the growth of streptococci and some other bacteria. They can themselves form it, as is shown by the fact that what is believed to be this substance can be extracted from them, and by the observation that it need not be provided in the culture medium. The further utilization of this substance, however, may be presumed to depend on an enzyme reaction which is subject to competitive inhibition by sulphanilamide; several analogous examples are quoted of competitive inhibition of enzyme reactions by substances related to the substrate. In the presence of sulphanilamide, therefore, an essential process in bacterial growth is interrupted unless an excess be provided from elsewhere of the substance concerned at this stage. This hypothesis throws a flood of light on several formerly obscure facts. The factor now believed to be *p*-aminobenzoic acid exists in small amounts in a variety of materials, including some of those from which ordinary culture media are made; hence, doubtless, the unimpressive degree of sulphanilamide bacteriostasis in most such media. The quantitative interdependence of drug and metabolite explains why a large inoculum will grow and a small will not: exhaustion of the available store of an essential substance explains the cessation of growth which follows after a few hours of multiplication in media containing sulphanilamide. Here, in fact, is a full elucidation of all observed *in vitro* phenomena, but what evidence is there that the same mechanism is at work in restraining bacterial growth in the body? This question is answered by F. R. Selbie,[4] who found that the simultaneous administration of *p*-aminobenzoic acid completely prevented the curative action of sulphanilamide on streptococcal infection in mice. Sulphanilamide is thus a bacterial poison for which *p*-aminobenzoic acid is an antidote in the body as well as in the culture tube. Whether it will also serve as an antidote to the toxic effects of the drug on the body perhaps involves other questions and remains to be seen.

The contribution to this series of papers by Fildes[5] himself is concerned with the action on bacteria of mercury perchloride. This subject is apparently unrelated only because it has not hitherto been understood. The argument employed follows much the same lines as in the work on sulphanilamide; the bacteriostatic action of mercury can be neutralized, as is well known, by H_2S, but also by –SH compounds; such compounds are essential metabolites in

[1] *Brit. J. exp. Path.*, 1940, **21**, 74.
[2] *Lancet*, 1939, **2**, 10.
[3] *Brit. J. exp. Path.*, 1940, **21**, 38.
[4] *Brit. J. exp. Path.*, 1940, **21**, 90.
[5] Ibid., 67.

all bacteria; mercury combines with them to form compounds not containing the –SH group: is this the mechanism of its action on bacteria? The answer is furnished by experiments showing that there is a quantitative relation between the amount of mercury perchloride in a culture medium and the amount of glutathione which must be added in order to restore growth. Bacteria which have been apparently killed by low concentrations of mercury perchloride can be revived by the addition of glutathione. It is difficult to believe that this is the only action which mercury perchloride has on bacteria, particularly since nothing will revive them after much shorter periods of exposure to greater concentrations. That it is the only action exerted by low concentrations is clear. There is thus an exact parallel between the actions of perchloride of mercury and of sulphanilamide; both interrupt an essential metabolic process, and the effect of both can be inhibited by providing an excess of the metabolite on which they act. Nobody will deny that mercury perchloride is a bacterial poison, and this term or any other carrying the same meaning can therefore properly be applied to sulphanilamide, however innocuous a substance it may superficially appear to be. In view of the contempt with which Continental authors in particular have dismissed the *in vitro* effect of sulphanilamide as of little account, there is a certain element of humour in this close comparison with a well-known and simple disinfectant.

It should be a source of satisfaction that the fundamentals of this problem have been reached and exposed by British workers. Major credit for the original discovery of prontosil must always go to the patient empiricism of German experimentalists; France, the U.S.A., and ourselves have contributed most to its extension and accurate clinical study. The present achievement will rank high in future judgment, not for any practical result which immediately accrues but because it puts one of the greatest therapeutic advances of all time on an intelligible basis.

CEREBROSPINAL FEVER

Although it must have been apparent to medical practitioners and to others who study our epidemiological notes that we are passing through a period of unusual prevalence of cerebrospinal fever, the magnitude of the outbreak may not have been generally realized. The first table included in Dr. Underwood's article on page 757 of the current issue makes it clear. Whereas the largest number of notifications in any previous complete year amounted to 2,566 in 1915, already 5,093 had been reported during the first quarter of 1940. The difference is remarkable even when allowance is made for the fact that the recent records include non-civilians while the earlier do not. The weekly returns indicate that the incidence is now declining, but the notifications for any week so far reported in April have still exceeded the annual total of some of the inter-war years. The seasonal peak of endemic cerebrospinal fever may occur in either the first or the second quarter. Usually there is no great difference in the level as between these two quarters, and it is likely that April-June of this epidemic year will still show a high incidence, although much lower than that of the first quarter.

When the recorded history of this disease is examined its predilection for soldiers is apparent, and the like sequence to mobilization of our two major epidemics in 1915 and 1940 is notable. Nevertheless, the first severe outbreak in this country—which occurred in Glasgow, the West of Scotland, and Northern Ireland in 1906–7—had no such connexion, nor had the North of England outbreaks of 1931–2, which caused the national notification figures to rise nearly as high as in 1915. Quite apart from this latter event, the prevalence of cerebrospinal fever has been rising nearly as steeply since 1923 as it fell from 1915 to that year. Further, during the last few years the Ministry of Health laboratories have found an increasing proportion of Group I micro-organisms among the meningococci isolated from material reaching them. It is possible, therefore, that an outbreak was due in any case, but its magnitude has probably been determined by the coincidence of mobilization with one of the most rigorous winters in history. The influence of overcrowding and bad ventilation was demonstrated in 1907 by Chalmers,[1] and received general recognition after Glover's researches during the last war. The bitter weather of last January and February made it almost impossible to secure even moderately good ventilation in Army quarters or in private houses or other civilian dwellings. It is not surprising that swabbing of contacts and even of random groups of the population has revealed a high proportion of infected nasopharynges; a state of affairs generally regarded as precedent to the occurrence of cases, in spite of the curious findings of Dudley mentioned by Dr. Underwood. Recent experience therefore confirms the past observations that cerebrospinal fever is sensitive to internal atmospheric conditions and that it breeds vigorously among young soldiers, especially when they are first gathered together from town and country; and that, like other zymotics, it waxes and wanes irrespective of these factors. The unprecedented degree of increase in 1940 may be reckoned as the combined effect of four waves reaching their crests at the same time—namely, the cyclic, the seasonal, the meteorological, and that of human recidivism.

The difference in size between this epidemic and its predecessors may not be revealed by the death rate. The preliminary calculations made by Dr. Underwood show that even in those areas with the highest rate of mortality it is far below that of past outbreaks. While it would be unwise to disregard the possibility of declining virulence in the disease, the sudden change of fatality and in the incidence of grave sequels among cases treated in institutions with the adoption of chemotherapy at any time during the past five years leaves little doubt that treatment with sulphapyridine is entitled to most if not all of the credit. Nevertheless, this great improvement should not blind us to the fact that case mortality rates varying from 9 to 35 per cent. still leave cerebrospinal fever among the more

[1] *Trans. epidem. Soc. Lond.*, N.S., 1906–7, **26**, 121.

fatal infectious diseases. This repetition of an old lesson in the elements of hygiene should finally influence those responsible for the conditions under which human beings are allow d to come together in enclosed places.

PREVENTION OF DIPHTHERIA

The welcome fall of diphtheria in South Shields, referred to in our epidemiological notes last week, is to be attributed in part to the intensive immunization campaign carried out there. Field experience has once again confirmed the expectation, originally founded on laboratory experiment, that the injection of the prophylactics at our command will give efficient protection. The two chief problems that remain concern "propaganda" and the best method of immunization. Education and persuasion of the public are not simple matters in our democratic community. The Central Council for Health Education, partly supported by the Ministry of Health, does excellent work in the preparation and distribution of leaflets for the public. The Ministry itself desires that the advantages of immunization "be brought to the notice of parents," and "where practicable the necessary facilities should be offered to them." Is this as far as the central guardian of the public health can go? If it is, what further can be done and by whom? Sir John Ledingham,[1] in his stimulating address at Aberdeen, hoped for "an encouraging lead" from the Ministry and other health authorities, lamented that London has but 5 per cent. of its child population immunized, and debated "some form of compulsion" with evident favour. Apart from the wider political implications of any further interference with personal liberty in the midst of the encroachments of war, it is doubtful whether a substantial proportion of those medical officers who have had most experience of the long and troubled history of compulsory and pseudo-compulsory vaccination against small-pox, and feel that the aftermath of that compulsion has hampered their strenuous efforts to introduce anti-diphtheria immunization, would consider compulsion favourably. Legal enforcement apart, what can be done to obtain the "written consent of parents or guardians" which the Ministry emphasizes? Sir John Ledingham tells us that in Aberdeen County 80 per cent. of parents gave consent, while in Aberdeen City the figure fell to 52 per cent.; and he reminds us again that it is only when the majority of children are immunized that a great abatement in incidence and mortality can be counted on. Must we adopt American massive publicity with special newspapers, urgent cinema appeals, vast moving illuminated signs, mobile inoculation vans in the parks; and would the public respond either now or in more peaceful times? Is the only alternative the acceptance of the 60,000 annual notifications and 3,000 deaths mentioned in the Ministry of Health's recent memorandum?[2]

When the decision to immunize has been finally taken, what is the most suitable procedure? The Ministry has described the numerous prophylactics offered to the practitioner. It is possible to argue for a clear recommendation of one procedure, leaving the practitioner or official who is especially interested to digest the articles in the medical journals and make his own choice. As the text stands, one must read with some care to conclude that the Ministry probably favours as a routine for young children alum-precipitated toxoid (A.P.T.) given in two doses four weeks apart, the first dose being 0.1 c.cm. (though in children of the lower school ages it might well be 0.5 c.cm.) and the second dose 0.5 c.cm., except where unusual reaction after the first dose indicates a change to two doses of T.A.F. The health official may well cogitate over one further point—that "in all cases the Schick test should be done not less than two months after the last injection." Recent workers with A.P.T. whose results have been referred to in these columns in the past obtained a Schick-negative rate of about 98 per cent. A demand for the return of the child two months after immunization for the extra prick of the final Schick test, and subsequent attendance for reading, may dissuade hesitating parents; there would be a strong argument, when considering mass immunization, for using the late Schick test only occasionally in small groups for checking the efficiency of the methods in use.

With the child at last successfully immunized, the question arises, How long will the Schick-negative condition be maintained, whether it has been induced by prophylactic immunization or not? This oft-repeated question is answered with different figures by different investigators. J. F. Warin[3] recently retested 110 children who had been immunized with T.A.M. and T.A.F. between 1930 and 1935; 7 per cent. had again become Schick-positive. Chesney[4] by 1937 had, with two doses of toxoid alum precipitate, immunized 1,200 children in a group with a natural Schick-positive rate of 75 to 78 per cent., and all but two were Schick-negative eight weeks later; of these children 112 were tested eighteen months later in a non-epidemic period and all were still negative. Parish and Okell[5] in 1928 retested 440 children from one to seven years after successful immunization; 5 per cent. had become Schick-positive. Sigurjónsson,[6] working in Iceland at a time when diphtheria had been almost entirely absent in the area, obtained less satisfactory figures. Of 867 children who received an injection of two spaced doses of alum toxoid 95 per cent. were Schick-negative eight months after the injection, but four years later only 66 per cent.; the corresponding figures when one dose only of prophylactic was injected being 486 with 19 per cent. remaining negative. A group of 134 children received two spaced doses of Ramon's anatoxin; 80 per cent. were negative after eight months, but only 26 per cent. three years later. The lack of uniformity in the figures given by different writers need not disturb us unduly, for there were many variables. The authors worked with different batches of prophylactic and with groups of children not necessarily similar. Urban Schick-positive children can be immunized more easily

[1] *British Medical Journal*, 1939, **2**, 841.
[2] Ibid., 1940, **1**, 199.
[3] *British Medical Journal*, 1940, **1**, 655.
[4] Ibid., 1937, **1**, 807.
[5] *Lancet*, 1928, **2**, 322.
[6] *Z. Hyg. InfektKr.*, 1939, **122**, 189.

than rural subjects. Even guinea-pigs from two breeders may not give exactly the same value for the same specimen of prophylactic, and those who manufacture prophylactics know that successive batches made by the same staff may not agree closely in value. Among children who are found to be Schick-negative without previous artificial immunization a certain percentage may show a positive reaction if tested some years later. The figure found in the twenty-eight children tested by Sigurjónsson in Iceland is extraordinarily high, for 50 per cent. of them had become Schick-positive. In most communities the figure would be below 5 per cent. Even though these children have again become Schick-positive, it is the capacity of the tissues of the body, as Warin remarks, to produce antitoxin rapidly in response to a suitable antigenic stimulus which is the true measure of protection, and not the amount of circulating antitoxin in the blood or the response to the Schick test at a given moment. Those children who have reverted to the Schick-positive condition have a high degree of potential immunity, though, as Parish and Wright[7] and Fraser and Pantin[8] have stressed, it would be wise, especially in the face of an epidemic of severe diphtheria or on entry into school, with its risk of infection, to inject one further dose of prophylactic into all children and raise their immunity to a high level. The prophylactic chosen should be one giving good immunity, and alum-precipitated toxoid would here seem to have a high claim; as Dr. Lewis[9] pointed out in our last issue, it is important that proper technique should be employed.

SAFE MILK

Among the medical problems raised by the war the administrative technique of evacuation has hitherto kept the health authorities so fully occupied that they have had great difficulty in maintaining, much more in expanding, their normal services for the prevention of infectious disease. Evacuation itself, moreover, has raised problems the full import of which cannot yet be realized. The letter from the Registrar of the Royal College of Physicians of London on behalf of the President and Fellows which we publish on page 788 of this issue draws attention to two of these problems—namely, immunization against diphtheria and the dangers of raw milk. The former we deal with in a leading article on another page. The second is the old problem of the dangers of raw milk, on which so many representative medical bodies have already expressed their opinion. In London and in many of the large towns from which evacuation has taken place a high proportion of children have been brought up on dried, pasteurized, or sterilized milk. Many of these children are now distributed in small towns and country districts, where pasteurization has not so far been generally adopted. They must almost inevitably be exposed to infection with the tubercle bacillus, with *Brucella abortus*, or with some other pathogenic organism. The consequences of infection with the tubercle bacillus may not be immediately obvious, but in the years to come, particularly if the standard of nutrition falls, as it may well do, they may be very serious. It is imperative that these dangers should be avoided. How, it may be asked, can pasteurized milk be supplied away from the large towns? The difficulty is probably not so great as it appears at first sight. The Co-operative Societies are spreading rapidly, and in many areas little difficulty should be experienced in obtaining delivery of pasteurized milk to schools, camps, and other aggregations of children. Again, some of the large dairy companies in London have receiving stations and factories in different parts of the country. In some of these milk can be pasteurized by the official holder process. In others it could be treated by the short-time high-temperature process, which, though not officially recognized in Great Britain, is used extensively on the Continent and produces results almost identical with those of holder pasteurization. The margin of safety may be less, but the systematic use of the phosphatase test should be sufficient to control the adequacy of the heat treatment. Where children are dispersed in groups too small to justify the expense of special transit the milk should be brought to the boil for a few seconds in a closed, preferably water-jacketed, container, or reconstituted from powder and suitably flavoured with some chocolate preparation. In a war in which we are being urged to avoid waste of paper, of tin, of iron, and other valuable materials, it is well to remember that there is such a thing as waste of life and of health. Diphtheria and milk-borne disease are both preventable. We have enough knowledge at our disposal to eliminate them almost entirely. Is it too much to ask the medical practitioners and health authorities of this country to do their best to educate the public in the danger of these diseases, to tell them how they may be avoided, and to afford the necessary facilities for their prevention?

[7] *Lancet*, 1938, **1**, 882.
[8] *Canad. J. publ. Hlth.*, 1936, **27**, 597.
[9] *British Medical Journal*, 1940, **1**, 728.

LIPOCAIC

It has been recognized ever since insulin first became available that the pancreatectomized dog differs from the human diabetic. Although the glycosuria in dogs can be controlled by injections of insulin, the animals usually fail to survive more than a few months, and die with an extensive fatty infiltration and degeneration of the liver. This infiltration may be so extreme that the liver is enlarged to three or four times its normal size and the normal structure is entirely obscured. If, however, the dogs receive adequate amounts of raw pancreas in the diet then the insulin will keep them alive indefinitely. This curious discovery, made sixteen years ago, has been closely investigated during the last few years by Dragstedt and his co-workers. They were first able to satisfy themselves that the beneficial effect of raw pancreas was not due to its content of pancreatic enzymes. The active principle was found to be retained in an alcoholic extract of the gland which not only prolonged the life of pancreatectomized dogs but prevented fatty infiltration of the liver. Further, direct inspection of the liver at repeated laparotomies showed that severe fatty infiltration of that organ could be cured by administration of the extract by mouth. In a recent paper on this subject Dragstedt and his associates[1] have shown that the presence of insulin in the extracts did not account for this action. A pancreatectomized dog receiving insulin injections to control the glycosuria may also be given large quantities of insulin by mouth without fatty infiltration of the liver being prevented. About seven years ago a group of workers with Professor C. H. Best found that the inclusion of 2 grammes or more of choline in the diet prevented this type of fatty infiltration; it was possible, therefore, that the action observed by

[1] *Arch. intern. Med.*, 1939, **64**, 1017.

Dragstedt was also due to choline extracted from the pancreatic tissue. Dragstedt, however, has shown that this is not the case by preparing active extracts containing only traces of choline—traces far less than the minimum amounts required to have any detectible effect. Nor did the feeding of liver or brain, which contain large quantities of choline, have any beneficial result. There was thus strong evidence for believing that there is in the pancreas some substance intimately concerned with fat metabolism, the absence of which leads to an accumulation of fat in the liver to an extent that may seriously interfere with hepatic function. Dragstedt believes this to be a new hormone and has named it lipocaic. What part this substance plays in human pathology has yet to be determined. In human diabetes mellitus fatty infiltration of the liver may result from inadequate control of carbohydrate metabolism, but Dragstedt believes that in some properly controlled cases similar fatty infiltration is due to a deficiency of the hormone lipocaic. Many toxic substances can cause a severe fatty infiltration of the liver, the best known being alcohol, chloroform, and phosphorus. It is to be hoped that in lipocaic may be found a means of controlling a pathological process which has not hitherto been amenable to treatment. One well-studied case of obesity and diabetes has already been reported by D. H. Rosenberg,[2] in which gross enlargement of the liver with poor hepatic function was found by biopsy to be due to fatty infiltration. Treatment with lipocaic by mouth for nine weeks resulted in a return to normal of the liver function and a marked diminution in size of the organ, a second biopsy showing a great reduction in liver fat and a return to a normal appearance.

[2] *Amer. J. digest. Dis. Nutr.*, 1938, **5**, 607.

SURGICAL PHYSIOLOGY

In wartime surgery necessarily takes stock and considers what measures are best in emergencies. It becomes possibly a little conscious of its limitations, and sees more clearly the need for investigation and new views on its problems. Pathology and bacteriology have assisted greatly in the advance of surgery, and the surgeon has long been familiar with the subject of surgical pathology or what is commonly called morbid anatomy. The position of anatomy and physiology has been quite different. They have been looked upon as the basis of surgical craft, but their advances have been regarded as more remote and academic. Physiologists have in part been to blame, and their subject has suffered from being tethered to the necessarily more static twin sister anatomy. Yet there are few thinking surgeons who do not realize how much modern surgery depends on recent advances in physiology. The Royal College of Surgeons of Engand has now established three lectures in surgical physiology, and in so doing has broken new ground and is to be congratulated. The first subjects chosen have been the circulation in relation to shock, pain, and spinal anaesthesia, but it is obvious that there are many others which might equally well have been chosen. For some time there have been many who have felt that the Primary Examination for the F.R.C.S. could be made of more value to the prospective surgeon and that instead of the minute detail of anatomy and physiology more attention should be paid to the requirements of surgery, for the advance of surgery must depend on the experimental method, and especially on the methods used in physiology. It is thought, therefore, that great gain would accrue from the young surgeon having to familiarize himself not with much irrelevant fact but with the steps and methods by which the advance of surgery has taken place. These lectures are not intended to be connected with the Primary Fellowship Examination, for it is considered that provincial and oversea candidates might thereby be at a disadvantage, but they are undoubtedly a step in the right direction and may well lead to a revolution in the methods of training the young surgeon.

X RAYS AND BACTERIOPHAGES

The true nature of bacteriophages has been hotly debated. One view regards them as abnormal products of bacterial metabolism reproducing themselves by autocatalysis; another, as organismal entities parasitic on bacteria. In favour of this latter view is the discovery that bacteriophages vary considerably in size. Two methods have hitherto been used for determining the size of bacteriophages. The first consists of filtration through graded collodion membranes of known pore size; the second, based on Stokes's law, employs differential centrifugation. The original methods of centrifugation introduced by Bechold and Schlesinger[1] and Schlesinger[2] have been greatly improved by Elford,[3] with the result that the values obtained by centrifugation approximate very closely to those furnished by filtration. This remarkable concordance of results suggests that the sizes assigned to a number of bacteriophages actually correspond very closely to reality. Other physical methods have been applied to the problem of bacteriophages. Destruction of bacteriophage by ultra-pressures shows no relation between their dimensions and their reaction to pressure. Wollmann and Lacassagne,[4] however, have found that the size of bacteriophages is closely correlated with the dose of *x* rays necessary to bring about their inactivation: the greater the relative size of the bacteriophage the smaller the dose of *x* rays required. Different bacteriophages—a staphylococcus and a typhoid phage, for instance—known by filtration methods to be of the same dimension are inactivated by the same dose of *x* rays. These results show that in this inactivation factors other than size play little or no part, and suggest that the portion of the bacteriophage particle which is sensitive to *x* rays corresponds with the actual bacteriophage and not with some inert supporting material. This suggestion agrees with the view now rapidly gaining ground that the pathogenicity of certain plant viruses, such as tobacco mosaic, resides in a single protein molecule.

[1] *Biochem. Z.*, 1931, **236**, 387.
[2] *Z. Hyg.*, 1932, **114**, 161.
[3] *Brit. J. exp. Path.*, 1936, **17**, 399.
[4] *Ann. Inst. Pasteur*, 1940, **64**, 5.

MINISTRY OF HEALTH PROMOTIONS

The Minister of Health has approved the following promotions: Sir Weldon Dalrymple-Champneys, Bt., M.D., F.R.C.P., to be Deputy Chief Medical Officer (acting) of the Ministry from August 1, 1940, in succession to Dr. Thomas Carnwath, D.S.O., who is retiring from the public service. Dr. Dorothy Mary Taylor to be Senior Medical Officer (acting) from June 5, 1940, in succession to Dr. Isabella Douglas Cameron, who is retiring from the public service. Dr. Edwin Lawrance Sturdee, O.B.E., to be Principal Regional Medical Officer (acting) from August 1, 1940, in succession to Sir Weldon Dalrymple-Champneys.

Dr. John Ritchie has been appointed a member of the General Medical Council, as Crown Nominee for Scotland, for five years from May 4, 1940.

SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

SURGICAL INFECTIONS OF THE FOOT

BY

NORMAN C. LAKE, M.D., M.S., D.Sc., F.R.C.S.

In considering infections of the foot it is almost impossible to avoid a comparison with the hand, and as a good deal more attention and study have been devoted to hand infections than to the corresponding infections of the foot it may be of some help to pursue the comparison.

Anatomically there are very obvious points of resemblance between hand and foot—the arrangement of the digits and their bones, joints, and tendons, etc.—but the sole of the foot presents differences due to the additional muscles there found—the flexor brevis digitorum, the accessorius, etc.—while the relative size of the corresponding structures in fore and hind limbs differs greatly. The general impression, however, is of the close resemblance, yet the problem of foot infection is by no means the same as that met with in the hand. The main reason for this is not anatomical but depends upon the very diverse functions of the hand and foot. Thus the hand, usually unprotected, is employed in all forms of work and occupation, whether designated "manual" or not. Infections introduced by external agents—needles, knives, tools, splinters, etc.—are therefore very common and constitute the chief source of hand infections.

The foot, on the contrary, is nearly always protected, not only by its thick layer of cornified tissue but additionally by the boot or shoe; nor does it come into immediate contact with potentially dangerous tools or mechanism. As a result it is rare to find infection of the thecal sheaths or of the deep lymphatic spaces of the foot, both of which are common in the hand. Foot infections usually arise in some pre-existing pathological structure such as a bursa under a corn or callosity, or an ingrowing toe-nail. The sites of origin and the planes of subsequent spread are thus different in the two extremities. It must not be overlooked that not only are the protective nervous reflexes of the body, which so readily withdraw the hand from potential danger, less developed in the case of the foot, but in addition the foot is usually carrying the body weight and so cannot be withdrawn from danger until the gravitational axis has been transferred to the opposite limb: a split second is thus lost, which leads to many a crushing injury to the foot. The increasing number of road accidents is a factor tending to multiply the cases of grossly infected contused wounds, often affecting the deeper structures. The motor bicycle appears to be particularly unkind to its rider in this respect, the feet being often badly damaged by contact with the various exposed and projecting parts of the mechanism.

There is a further reason why the spread of infection in the foot has not been so intensively studied as it has been in the hand—namely, the lesser economic importance of the foot. In most kinds of work the loss of a part of the lower limb does not interfere seriously with a man's ability to continue, but this is obviously not true of the loss of even a small portion of the upper limb.

The arrangement of the thecae in the toes closely resembles that in the fingers, but they are of necessity much smaller; none of them extend back to the sheaths around the ankle corresponding to the extensions to the wrist bursae in the hand. The fascial spaces on the dorsum are subcutaneous and subaponeurotic as in the hand; on the plantar aspect, however, they are more numerous and differently arranged. Their position will be best appreciated by reference to Fig. 1, which may

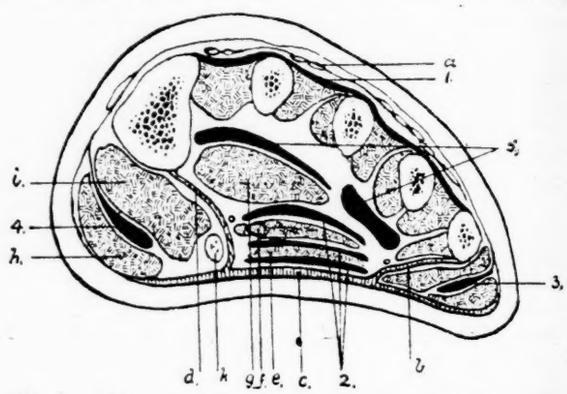


FIG. 1.—Diagrammatic cross-section of the foot showing fascial spaces. *a*, extensor aponeurosis; *c*, plantar fascia, with *b* and *d*, deep extensions; *e*, flexor brevis digitorum; *f*, flexor longus digitorum and accessorius; *g*, adductor hallucis; *h*, abductor hallucis; *i*, flexor brevis hallucis; *k*, flexor longus hallucis. 1, dorsal subaponeurotic space; 2, central plantar spaces; 3, lateral plantar space; 4, medial plantar space; 5, deep plantar space.

with advantage be compared with the corresponding diagram of the hand given in the issue of October 1, 1938 (p. 717). The deepest spaces correspond to the thenar and palmar spaces in the hand, and are well displayed in the cadaver when injected with lipiodol as in the radiograph of which Fig. 2 is a drawing. The anterior

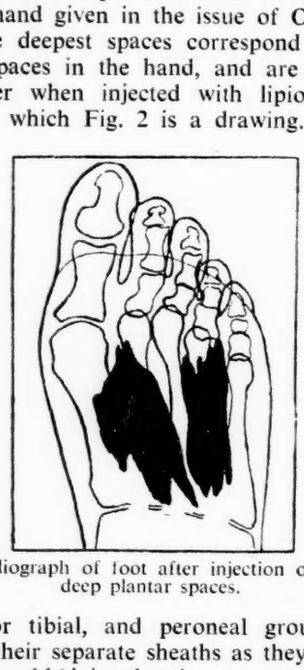


FIG. 2.—Radiograph of foot after injection of lipiodol into deep plantar spaces.

tibial, posterior tibial, and peroneal groups of muscle tendons have their separate sheaths as they pass over the vicinity of the ankle-joint, but in no case do they extend far enough forwards to become continuous with the sheaths of the digits.

Superficial Infective Conditions

Superficial infective conditions are found chiefly on the dorsal aspect and sides of the foot; the thick plantar skin with its intimate attachment to the plantar fascia is much less commonly affected. In most cases the infection

arises as a spread from an inflamed bursa or blister, an interdigital fissure, an ingrowing toe-nail, and such-like. The loose character of the skin in this situation allows of well-marked inflammatory oedema; the whole dorsum of the foot becomes puffed up and the depressions around the malleoli are obliterated. Such infections, particularly if streptococcal, may be associated with lymphangitis, usually seen on the front and inner side of the leg, and with enlargement of the inguinal lymphatic glands. A septicaemia, not uncommonly fatal, is the most serious complication. Oedema of the dorsum is also met with in deep infections of the sole or of the bones, and, as in the case of the hand, pus confined under the plantar fascia, especially in the deeper spaces, will make its way along the lumbrical tendons to the interdigital spaces or sometimes to the side of the foot. Thrombosis of the superficial veins on the dorsum may accompany or be the origin of the infection.

Inflammation of the end of the digit and nail-bed arises from an ingrowing toe-nail, but may also be secondary to a subungual haematoma. The ordinary thecal whitlow is rare; when it does occur there is no direct spread to the ankle region, for the anatomical reasons given above.

The bursae which commonly become infected are those (either true or false) associated with corns—that over a hammer-toe, the one over the head of the first metatarsal, and those around the insertion of the tendo calcaneus (tendo Achillis). As the overlying skin is nearly always pathologically thickened the infection is unable to reach the surface, and so spread in other directions is provoked.

Reference to Fig. 1 shows that the superficial musculature of the sole is divided into three parts by deep extensions of the plantar fascia. The medial and lateral compartments are continuous around the sides of the foot with the superficial fascial compartments on the dorsum; when suppuration occurs in them the pus tracks to the sides of the foot, and here the maximum swelling and tenderness are found.

As already noted, central infections spread forwards to the interdigital spaces. It must be remembered, however, that deep infection is rare in the absence of a penetrating wound, through which discharge naturally occurs. A state of affairs corresponding to the "Kanavel hand" is thus very rarely encountered in the foot.

Acute Suppurative Conditions

Although chronic affections of the joints of the foot are fairly common, acute suppurative infections are uncommon in the absence of injury. Occasionally suppuration in the bursa over the head of the first metatarsal spreads through the capsule into the underlying joint; this applies also to the bursae associated with hammer-toe and corns. Blood-borne streptococcal arthritis sometimes occurs in the ankle and other joints, and a gonococcal invasion of the capsules of the tarsal joints and the neighbouring ligaments and fasciae is a potent cause of acute flat-foot. Acute osteomyelitis of the tarsal and metatarsal bones is commoner than infection of joints, and leads to all the classical signs and symptoms of the condition. The only bone in the tarsus having an ununited epiphysis at the age when osteomyelitis is common is the calcaneus; for this reason both acute and chronic osteomyelitis occur more often here than in the other bones. A special feature of osteomyelitis of the tarsal bones is that the very intimate connexions between them allow infection to spread readily from one to its neighbours, and so several bones become involved. A word of warning may be added, however, regarding the radiographic appearances, for even when one bone alone is involved the active hyperaemia induced causes a widespread absorption of calcium salts which, producing a diffuse rarefaction in the radiograph, may be very misleading. Pus arising from the bones tends to track under the dorsal aponeurosis, producing an extensive oedema which makes localization of its origin difficult. Such a collection spreads laterally and points on the sides of the foot.

Gangrene of the toes and foot is associated with infection usually only when of the moist diabetic variety; dry senile gangrene commonly remains uninfected. Localized patches of infected gangrene due to pressure may be found behind the heel or over the malleoli. In paralysed or bedridden patients they are produced by the mere weight of the leg resting on the heel; in other instances the pressure is caused by a badly fitting or improperly applied splint. The use of unpadded plaster splints is particularly hazardous in this respect, and calls for great care in application and constant subsequent supervision.

In addition to the coccal infections the foot is prone to invasion by the *Bacterium coli*, the *Clostridium welchii*, and the *Clostridium tetani*. As in the last two of these infections the prophylactic injection of antisera is of proved value this precaution should never be neglected in any penetrating injury. Recent work seems to show that the sulphonamide preparations are of value in cases of gas gangrene as in coccal infections; their prophylactic power, however, must still be considered as *sub judice*.

Chronic Infections

Of the chronic infections of the foot tuberculosis is the commonest. For reasons given above the calcaneus is more often involved than the other bones of the tarsus. In infancy tuberculous dactylitis may occur, affecting metatarsals or phalanges. As in the acute infections, the disease may spread to surrounding bones and joints, producing a general invasion of the whole tarsus. Apart from such widespread bone infection, the ankle-joint is not uncommonly the site of tuberculosis, and rarely the metatarso-phalangeal joint of the great toe is similarly affected.

Tuberculous tenosynovitis is not frequent in this region, but a "rheumatic" tenosynovitis is met with in the sheaths around the ankle-joint.

The sole of the foot is a common site for the secondary rashes of syphilis, but other syphilitic lesions, such as gummata, are rare. Typhoid fever occasionally causes a definite osteoperiostitis of the calcaneus, but usually the painful heels which may follow this and other fevers are, like those of influenza, due to renewed weight-bearing after prolonged rest rather than to local infection.

Treatment

As in other parts of the body, streptococcal cellulitis demands conservative treatment, and the same rule may be applied to those fulminating staphylococcal cases which occasionally result from infection with the *aureus* organism. The risk of opening up fresh areas to infection before the patient's general resistance is adequate and of thus causing septicaemia is so great that the older method of making multiple incisions to relieve tension is definitely hazardous. In such cases the use of chemotherapeutic agents of the sulphonamide group, and possibly also of antitoxic sera, should be adopted until there is definite evidence of localization and pus formation. Thenceforth the case may be treated as any other infection. In true erysipelas the infection is so superficial that it is both logical and of proved value to use ultra-violet rays.

Incisions for drainage should be made on the lateral aspects of the foot, for these are the positions to which natural drainage tends. Incisions through the sole should be avoided, not only to escape a scar in an area subject to pressure, but also because deep suppuration can be reached only at the risk of possible damage to the many important structures in this region. The best incisions for dealing with infections of the toes are analogous to those advocated for the fingers (*British Medical Journal*, 1938, **2**, 798). In particular, infection of the pulp of the terminal phalanx should be drained by a horseshoe incision skirting the end of the toe, the whole pulp being turned back as a flap by raising it off the phalanx. Suppuration in a bursa under a corn may often be dealt with by paring down the cornified layer until the cavity is entered, since in many instances the pus lies in a mere cavity in the epidermis. For the larger true bursae in the dermis or subcutaneous layers a proper incision is necessary. In treating the infection associated with an ingrowing toe-nail the most important point is to remove the small "splinter" of nail which will be found to have penetrated the soft tissues in the lateral nail groove. When the acute condition has subsided it will be necessary to consider the performance of some radical procedure to prevent recurrence.

Acute osteomyelitis is usually treated by immediate drainage, but if localization is uncertain it is sometimes better, provided the patient's condition allows, to wait a little rather than to endanger important structures by exploratory dissection. Especially is this true since the introduction of chemotherapy for coccal infections, for there is no doubt that these materials help to overcome the general blood infection and assist localization. When the bone has been drained, further treatment may with advantage be by the closed method of Winnett Orr.

Lacerated wounds of the foot are first of all dealt with as soon as possible by surgical cleansing and débridement. Whether subsequently the case is treated by the modern method of enclosure in a plaster case after careful packing of the open wound, or whether the older methods of open drainage are adopted, is largely a matter of individual judgment and experience. The demoralizing effects of frequent painful dressings are certainly avoided in the newer methods, and the patient's resistance to spread of infection can usually be relied upon under the conditions of absolute rest to the part which they produce; but it is possible that the case in their favour has been a little overstated in the general enthusiasm for something new. The same criticism may be offered of the tendency to adopt an extremely conservative attitude in the presence of early infections, for there is no denying that very brilliant results can be obtained by courageous and well-designed operative measures in these cases. The whole subject is, however, in a state of flux, and it would be foolish to dogmatize either way.

Tuberculous osteitis of the foot, in the absence of general contraindications, often needs surgical intervention, which consists in thorough curettage of the cavity, followed by packing with some such antiseptic as formalin 2 per cent. in glycerin. General constitutional treatment and local rest are as important here as in other regions, and in many cases, especially in the young, will be all that is required.

Tuberculosis of the ankle-joint is treated conservatively with good results; but in the adult, and especially in the senile, sinuses are apt to form, and then the question of amputation must be seriously considered.

PARANASAL APPROACH TO INTRA-SELLAR TUMOURS

SEMON LECTURE BY PROFESSOR NAGER

The annual Semon Lecture of the University of London was delivered at the house of the Royal Society of Medicine on May 2 by Dr. F. R. NAGER, professor of oto-rhino-laryngology, University of Zurich. The chair was taken by Mr. T. B. LAYTON, president of the Laryngological Section. Professor Nager dedicated his lecture to the memory of Harvey Cushing, and quoted a sentence from his *Consecratio Medici*: "There is only one thing that can effectively bind people, and that is a common devotion."

In view of the successful approach of neurosurgery in the treatment of pituitary tumours by the trans-cranial method, said the lecturer, it might seem superfluous to deal with the extracranial approach; but he claimed that these less dangerous methods were not only justified but even indicated for special cases.

The method which he had himself followed was that of Chiari, originally published in 1911, but not generally known; it was a method of approach to the sellar region by the trans-ethmoidal and the trans-sphenoidal route.

Technique of Operation

The operation is performed under local anaesthesia, eventually combined with evipan. By a curved incision the soft tissues are removed following the lamina papyracea and going very deeply into the orbit. With special spatulas the contents of the orbit are kept to the side. All the ethmoidal cells are removed so that in the depth of this funnel the anterior wall of the sphenoidal sinus is visible. By resection the posterior wall becomes exposed, especially if the inter-sphenoidal septum and the rostrum, including the end of the nasal septum, are removed also. The whole anterior wall of the sella is then clear. Very often pituitary tumours lead to alteration of its colour or cause it to bulge. The very thin lamella has to be removed very carefully. The floor and the anterior wall should be eliminated as much as possible, but the upper part avoided because of the danger of haemorrhage from the cavernous sinus. The sensitiveness of the now exposed dura may be ameliorated by applying a gauze saturated with 10 per cent. cocaine for a few minutes. After painting with iodine solution the dura is punctured. If by aspiration a clear cerebrospinal fluid issues it proves that there is no tumour, but an internal hydrocephalus is present, and further procedure is contraindicated. If, on the other hand, it results in a dry puncture or in a little brownish-red liquid a tumour is present and the dura may be opened up by a cross-section. The contents of the sella will be removed so far as possible, either by long curettes or by suction, until the posterior wall of the sella can be felt by the probes. At this instant the dura collapses. After spraying some iodoform powder and applying a strip of gauze, the end of which protrudes from the nostril, the external wound can be sewn up. Following the operation the patient is given urotropin and calcium to prevent bleeding, although the lecturer had observed no considerable haemorrhage. The course is usually normal, and the stitches are removed on the third day and the strip of gauze on the eighth. The scar is almost invisible, even if a second operation should be necessary. The operation may be easily performed in about one hour, and the physical and mental strain on the patient is not severe, especially if compared with any trans-cranial procedure.

Professor Nager described thirty-eight trans-sphenoidal exposures which he had performed on thirty-four patients with pituitary tumours. With one exception—death after eight days of pneumonia from heart failure—there was no direct post-operative mortality, and Chiari's method might therefore be taken to be without real danger. Five patients died within a year, but in three of them the adenoma was of a decidedly malignant character. Within from two to five

years three patients died: one of a large intercerebral eosinophilic tumour, one of a neuroglioma, and the third of haemorrhage in consequence of late radionecrosis. Within from five to ten years after operation one patient succumbed from a stroke and one from bronchopneumonia. So far as he knew nineteen patients were still living. The late results could not be judged yet, the time since operation being too short, but seven patients were operated on between five and ten years ago, and two between eleven and twenty years. Four cases of recurrence were observed, and six further operations by Chiari's method were necessary.

Indications and Contraindications

The trans-sphenoidal approach to pituitary tumour (Professor Nager continued) was therefore not superfluous, but in certain cases had definite advantages. The chief indications for the paranasal route were large intrasellar tumours and special visual troubles—central scotoma and homonomous hemianopia—whereas tumours with suprasellar extension were better reached by the trans-frontal method. Trans-sphenoidal exposure of the sella was also contraindicated in hydrocephalus internus.

With increasing experience he had been convinced that the trans-nasal approach had certain marked advantages, especially as regards post-operative complications, but the categorical rejection of these methods by some eminent neurosurgeons had naturally caused misgiving. On this account the publications of Cairns and Henderson were all the more welcome because of their conciliatory attitude towards the principle of trans-nasal approach. To-day the question was no longer whether the trans-sphenoidal method was feasible but whether there were not certain pituitary tumours which were better approached by that method. It was not pretended that by this route all hypophyseal tumours could be removed, especially the suprasellar ones; for these trans-frontal craniotomy was available. But if the tumour was mainly or entirely localized in the dilated sella or its tendency was to grow downward the trans-sphenoidal route was undoubtedly advantageous.

Moreover, it had been shown that if the necessity for re-operation arose this could easily be performed by following the same method. So far as could be seen the healing process was normal and there was no danger of meningitis. Preliminary exposure by the trans-nasal route did not interfere with a secondary trans-frontal approach, because the rest of the tumour did not become infected, and the opening healed by fibrous or even bony tissue. Indeed, whether the secondary operation were performed by the same or by the trans-frontal route, the trans-sphenoidal approach would not have impaired it; on the contrary, it seemed that in cases of tumours with intra- and supra-sellar extension, as shown by x-ray findings, and with incipient eye troubles, the less dangerous procedure of Chiari might be used, while in recurrences the trans-frontal method was to be preferred.

The Save the Children Fund has just completed twenty-one years of work in the relief of child distress and the promotion of child welfare. Its activities extend to most European countries and even to China and the West Indies, and it is at present engaged in extensive work for war refugees, for the victims of the earthquake in Turkey, in social welfare work in Hungary, in supporting a pioneer hospital in Yugoslavia, and promoting nursery schools in the distressed areas of England and Wales, etc. In its twenty-one years the Fund has collected and spent over two and a half million pounds, which has been subscribed in sums ranging from a few pence to a cheque for £10,000. The Fund was the major influence in founding the Save the Children International Union, which consists of the similar organizations of twenty-five other nations, including France, Finland, Sweden, and the United States of America. It works in close collaboration with Government Departments and local authorities and with the foreign Governments concerned.

A.R.P. AT CLACTON

[FROM A CORRESPONDENT]

The Clacton A.R.P. organization is concentrated in and around the headquarters in Old Road. Here are located the headquarters staff, the first-aid parties, cars, ambulances, and mobile unit. In addition there are two first-aid posts—one attached to the Middlesex Hospital Convalescent Home, the other at the Clacton District Hospital, in both of which considerable structural alterations had to be made to adapt the rooms to the purpose of aid posts and cleansing centres. There are also four aid points situated in outlying parts of the district, which will function only when an incident arises in one of them. All these services are normally manned by a skeleton staff, which is standing by day and night and is ready to act in any emergency that may arise. The remainder, consisting of part-time unpaid volunteers, are called up as required. In the event of a raid the headquarters control would notify the heads of the various services, and call up by telephone or messenger such personnel as would be required. It would also pass on to these services requests for assistance received from the Warden and the Police. This, briefly, is the organization in Clacton.

On April 30 the first hint of possible trouble was the appearance about 11 p.m. of an unknown aeroplane which flew backwards and forwards over the town at an unusually low altitude. There was a complete absence of anti-aircraft activity, no searchlights illuminated the sky, no air raid warning was sounded, nor was any warning yellow or red received. After the 'plane had continued its to-and-fro flight for about a quarter of an hour it was noticed that the engine power was failing and that an attempt at landing would probably soon have to be made. Finally the 'plane turned inland, rapidly lost height, and then came down, striking the ground near the corner of Victoria and Skelmersdale Roads and crashing through a house on the west side of Upper Victoria Road; it came to rest in the gardens at the back. Reports are conflicting whether it was on fire before landing, but in any case it was soon in flames, and in a few minutes an explosion shattered the plane and did enormous damage to property for some distance around. Houses near by had the roofs and walls damaged, while the breaking of windows and doors extended over a wide area. The force of the explosion and the detonation were felt to a varying degree in different parts. To the east and north it is said to have been heard as far away as Colchester, sixteen miles, and Ipswich, twenty-five miles. On the other hand, many persons residing in the west front of Clacton itself heard nothing and managed to sleep through the din.

The Fire Brigade was early on the scene, and the first car with stretcher party, which was standing by on duty, left headquarters at 11.20 p.m. In the meantime the reserve first-aid personnel, ambulance drivers, and attendants were reporting, and the first ambulance left at 11.40 p.m., while the remainder of the stretcher parties were dispatched by midnight. The mobile unit left with a small skeleton staff of three at 11.30 p.m., to be joined by the medical officer of the unit at the scene of action.

The first-aid posts (constantly manned by a skeleton staff) were able to carry on until assistance from the reserves was given. The Middlesex first-aid post happened to be within two hundred yards of the crash, so there was no difficulty in conveying cases there for treatment, while many others were treated in their own homes. We were fortunate in having the assistance of several doctors on the spot. There was the medical officer of the mobile unit; another doctor happened to be on the spot; while two others, including the medical officer of the Middlesex aid post, live in the area of the disaster. The result was that immediate treatment was available within a few minutes of the explosion and cases could be sorted out and sent either to aid post or hospital, as appeared necessary. At the Clacton Hospital and first-aid post the medical officer was on duty at the time and was able to deal

with cases as soon as they arrived; he was later joined by others after they had finished their work at the site of the crash.

Most of the casualties consisted of minor cuts and bruises, especially about the hands, face, and head, the result of flying glass splinters. A fair number suffered from shock, but fractures were limited to one case of rib injury, and continuous bleeding to one of puncture of the external jugular vein, which was easily controlled. There was therefore no call for the application of splint or tourniquet. It is not possible to give an exact estimate of the number of casualties. Many were treated on the spot or in their own homes, while owing to congestion at the aid post others, after treatment, left without being recorded. The approximate numbers are as follows: treated at Middlesex aid post, at home, and at Clacton post, 90; treated by mobile unit, 20; sent to hospital, 34—making 144 in all. The actual number finally admitted to the Clacton Hospital was twenty-four, of whom only two were considered serious. Three cases of penetrating wounds of the eye were sent to Colchester Hospital. There were two civilian deaths, which occurred in the house struck and demolished by the explosion.

Conclusions

1. Everyone is agreed that the various services arrived promptly and did excellent work and that the co-operation was most satisfactory.

2. There must be some revision of the system of calling up personnel: it did not work well in this instance.

3. It is the general opinion that if an air raid warning had been sounded casualties would have been much reduced in number; and there would not have been a shortage of personnel. In connexion with the house in which the two deaths occurred, there was a concrete shelter in the garden which might have been used had a warning been given.

4. There should always be one or more medical men present at an accident of any magnitude. It is only in this way that cases can be properly sorted out and congestion at posts and hospitals avoided.

5. In a district which is not too densely populated the chief danger is from flying glass as a result of blast, and the obvious precaution in case of a raid is to keep as far away as possible from windows, all of which should be protected in some way to prevent splintering and projection into rooms.

6. In this particular incident the mobile unit hardly had a chance to assume its function as an aid post. The medical officer's time was taken up with minor injuries and sorting out casualties, no definite post being established at all.

According to the report of the tenth Australian-New Zealand cancer conference attention was directed in both Dominions in 1938 to improvement in radiotherapeutics, especially to greater precision and uniformity of dosage. The conference considered measures for improving facilities for diagnosis and treatment and for co-ordinating propaganda, but the principal subject discussed was cancer of the colon, rectum, and anus. Reference was made to the special problems resulting from relatively small and scattered populations. The results of treatment, it was said, could be greatly improved by centralization, and the conference passed a resolution stating that in the interests of the patients and the advance of knowledge it was necessary to segregate all cases of cancer of the colon, rectum, and anus occurring in New Zealand into one unit in charge of one team in each of the four large hospitals. The conference reviewed reports on the treatment of cancer by the Baker and Koch fluids and decided that patients in Australia and New Zealand had not received any benefit. It urged the Governments to introduce legislation to control the advertisement, sale, and distribution of substances claimed to cure or alleviate cancer unless the claims were confirmed after suitable investigation by a committee of experts.

Reports of Societies

RADIOTHERAPY IN CANCER OF UPPER RESPIRATORY AND ALIMENTARY TRACTS

At a meeting of the Section of Laryngology of the Royal Society of Medicine on May 3, under the chairmanship of Mr. T. B. LAYTON, the subject for discussion was radiotherapy in the treatment of malignant disease of the upper respiratory and alimentary tracts, excluding the tongue and oesophagus.

The PRESIDENT said that when a new therapeutic measure came forward three things might happen. It might lead to an advance on previous methods already in use; it might call for a complete reconstruction of the whole approach to the surgical problem; or it might, after a short appearance, be weighed in the balance and found wanting. All those present had probably been brought up with the idea that excision of the diseased area was the standby in surgical procedure. Was radiotherapy to be considered an accessory or a primary method of attack?

Results with Radiotherapy

Mr. G. F. STEBBING said that in this region of the body many different types of tumour were found; the possible primary sites were numerous, and there were so many different methods of evolution that a classification that was of any use at all was difficult and intricate. Of 392 cases of carcinoma of the pharynx and larynx admitted to Lambeth Hospital under his care during the ten years 1929–38, 190 were in such an advanced stage of disease and in so feeble a general condition that it was recognized at the start that only palliative treatment could be given. Of the 306 patients treated before the end of 1936, twenty-one were alive and free from symptoms three years later. If success was judged by the number of survivors the work must be regarded as a failure. But of the patients who ultimately died of carcinoma the large majority were rendered symptom-free for many months, sometimes for more than a year, before death from metastases in different parts of the body; he was bound to admit that there were some who, though they had this temporary respite, ended their days in a very distressed condition, due to infiltration of the growth in the thoracic inlet and supraclavicular region. He described the methods he used, the difficulties to be overcome, and the reason why, if he himself had a growth in these regions, he would expect the radiotherapist to give him a better chance of complete recovery than the surgeon or, if the treatment was to be a failure, an easier passage.

Mr. LIONEL COLLEDGE said that he had felt for some years that radiotherapy applied in the region of the pharynx and larynx had failed to justify itself, and that a heavy load of responsibility rested upon those who refused to abandon a method which was seldom successful and had been the cause of much suffering and loss of life. He had not reached this pessimistic conclusion because he thought that surgery could do everything for these cases, and he was only too well aware of its limitations, and that many patients presented themselves in an inoperable condition. He showed tables relating to 153 cases submitted to operation between 1930 and 1935, so that at least five years had elapsed since the last operation:

	No.	Died	Recurrence or Untraced	Known to remain well for more than five years
Intrinsic cases:				
Laryngofissure or partial laryngectomy	23	2	3	18
Total laryngectomy ..	75	14	18	43
Extrinsic cases:				
Pharyngotomy	39	9	18	12
Pharyngo-laryngectomy ..	16	3	10	3

The results were not so good as he desired, but they at least showed some return for the labour expended, and he had always felt that if some of the conveniences and cash lavished upon radiotherapy had been available more might have been accomplished. His pessimism concerning radiotherapy was based partly upon the results set out in the table published by the Medical Research Council for 1938, showing very few five-year results—eight out of 285 cases—and no ten-year results at all. It seemed to him that the reaction of new growths to irradiation showed that the whole basis of radiotherapy was built on sand, because local recurrence took place, except in rare cases, and unless the original cancer-bearing area was excised recurrence was almost inevitable. There were occasions when the employment of radiotherapy was justifiable, as in cases of malignant disease in the naso-pharynx, but it had failed to justify itself as a routine treatment for pharyngeal carcinoma, still less for laryngeal carcinoma.

A Plea for an Open Mind

Mr. W. G. HOWARTH said that in intrinsic cancer of the larynx in which the growth was small and confined to the edge of the vocal cord the surgeon could cure the patient in 80 per cent. of cases and leave him with a good and useful voice. What could radiotherapy do? He did not know, and he did not think the radiotherapist knew, because he was not allowed to see the early cases. To discuss the treatment of these cases by a combination of surgery and irradiation such as that popularized in this country by Mr. Douglas Harmer was to confuse the issue. In the more advanced cases he had not himself removed the larynx for some years, and he was now inclined to the view that laryngectomy was not a justifiable operation. The report of the Radium Beam Therapy Research showed a better way. The growth completely disappeared under radium, and the outlook was most hopeful. He favoured the use of irradiation even when there was massive infiltrating growth in the pyriform fossa and at the base of the tongue, having seen cases which were beyond the slightest hope of surgical intervention clear up almost magically under the method followed by Coutard in Paris.

Sir ALFRED WEBB-JOHNSON said that where radical operations entailed a heavy mortality or terrible mutilation surgeons would gladly welcome an alternative method of treatment. In some regions of the body irradiation had entirely justified itself. In the surgery of the larynx and pharynx it was necessary to ponder seriously whether to recommend radiotherapy or surgery. Surgeons must confess that some of the best figures obtained in radical operations were only the result of the work of certain men of superlative ability and mastery of technique, and would not be approached by the general body of surgeons working in that particular specialty. He was increasingly bewildered in the effort to obtain the truth from statistics. It was practically impossible to get comparable groups of cases. The great majority of cases that reached Mr. Stebbing were such as the most expert surgeon would not attempt to deal with by radical operation, and the fact that he had even a few patients alive after five years was encouraging.

Continental Experience

Professor F. R. NAGER (Zurich) said that in his clinic, under an enterprising radiologist (Professor Schinz), operations became increasingly rare. Indeed, there was some danger of losing surgical experience. On the other hand, the question of mutilation by operation was very important. He had, moreover, seen cases of laryngectomy in which, although the operation was successful, the patient constitutionally went downhill. Many extralaryngeal tumours could be treated quite well by radiotherapy.

Dr. HAYEK (late of Vienna) thought that the best results in carcinoma of the larynx were obtained by operation. The question of mutilation had different meanings for different people. He had patients living after fifteen (one after twenty) years following extirpation of the larynx. The appearance immediately after a radium or *x*-ray application was very deceptive.

Dr. N. S. FINZI said that statistics of surgical procedures and radiological procedures were not comparable, though comparability was increasing in certain clinics. He referred to an important publication lately issued from the Christie Cancer Hospital and Holt Radium Institute, Manchester, giving five-year results. Certainly at that centre they get a better type of case than was usually submitted to the radiotherapist. He himself had had great difficulties with carcinomas of the pyriform fossa, and though he had some patients who had remained alive for five years these were very few. Where the Trotter operation could be applied in such cases it would be as well to do it, even if one subsequently applied radium therapy as a means of eliminating any carcinoma remnants.

Team Work Required

Mr. W. HOLT DIGGLE said that he had been associated during the last seven years with one of the best-equipped radium institutions in the country—the Holt Radium Institute at Manchester. If radium was to be given a chance perfect team work was essential. Each case should be seen by a surgeon, a radiotherapist, and a pathologist, which three should decide whether irradiation or surgery offered the best chance of recovery. In the past irradiation had not received a square deal. For many years it was regarded merely as palliative therapy, and only inoperable cases were allowed to be treated. He thought surgeons were begging the question when they said that the two forms of therapy could not be compared statistically. In intrinsic carcinoma, taking just that type of lesion—a limited growth in the centre of the cord—which in the past could be treated most successfully by laryngofissure, radiotherapy by the Finzi-Harmer method could produce in a five-year period 75 per cent. of recoveries. In malignant disease of the nasal sinuses the results were probably in favour of surgery. In the nasopharynx radium yielded results far superior to any surgical achievement. Pyriform fossa and aryepiglottic growths gave surprisingly good results with deep *x*-ray therapy, but they could be improved if the first stage of the Trotter operation were adopted and access to the growth were obtained by the removal of the posterior three-fourths of the alar cartilage on that side.

Mr. SOMERVILLE HASTINGS said that he started with a very strong preference for surgery, but to-day, if he had an intrinsic cancer of his own larynx, early or late, he would choose radiotherapy. As regards the method of treatment, his experience of the implantation of radium or radon needles was unfavourable, but more satisfaction was obtained with the radium beam and *x* rays. He disagreed entirely with the view that laryngectomy should rarely be performed. He thought that for inoperable carcinoma which did not respond to radium it was abundantly justifiable, but, of course, a great deal depended on the extent to which the patient had to use or wished to use his voice.

Mr. V. E. NEGUS said that he had sent many patients for radiotherapy, but he was always careful to tell them beforehand that they were going to have a very uncomfortable time. He would only advise treatment by the fractional method, and this over four or six weeks meant a heavy strain upon the patient. As to laryngectomy, to take out the larynx was an unpleasant operation, which might be followed by good surgical results but bad psychological ones.

Mr. STEBBING, in reply, said that Mr. Colledge deceived himself with his statistics. He had compared a highly selected group of operable cases, which he himself had treated, with an entirely unselected number of cases treated by irradiation methods by a large number of different people all over the country, and for these he had taken the period 1926 to 1935, during the earlier part of which many clinics were feeling their way.

TUBERCULOSIS AND THE INDUSTRIAL WORKER

At a meeting of the Association of Industrial Medical Officers on April 19, Dr. R. E. LANE presiding, a discussion on tuberculosis and the industrial worker was opened by Dr. P. M. D'ARCY HART.

Dr. D'Arcy Hart produced evidence that increased industrialization leads to increased incidence of tuberculosis, especially in young women. The degree to which fatigue and strain were responsible was still disputed, but there were strong grounds in favour of spread of the disease by contact with open cases. Prophylactic methods suggested were improved ventilation, especially in the black-out, provision of plenty of working space, and the control of tuberculous cases. All new entrants to industry should be medically examined, especially where the risk of tuberculosis was high, and this should include an *x*-ray examination of the chest. There should also be subsequent periodical *x*-ray examinations, especially of young women recruited from rural areas, among whom there would certainly be a significant number having a negative sputum but liable to develop serious lesions on first infection. Dr. D'Arcy Hart pointed out that miniature fluorophotography was now possible for sorting purposes, and that three hundred pictures an hour could be taken for a few pence. There should be an *x*-ray examination in cases detected by fluorophotography.

Dr. CHARLES SUTHERLAND, in a paper on the tuberculosis risk in silica industries, said that if the inhalation of silica dust could be prevented the death rate from tuberculosis in these industries would be the same as among the ordinary population. He discussed the question of how and when the workers became infected with the tubercle bacillus and the possibilities of superinfection and reactivation of old lesions.

Sir HENRY BASHFORD believed that the majority of new cases were probably due to the activation of some earlier or childhood focus of infection, by intercurrent illness or strain rather than personal contact. Dr. STEWART pointed out the difficulties in the way of individual firms being responsible for *x*-ray examinations. Evidence of the need for them would have to be produced in view of the initial capital outlay involved, and many small firms had no facilities for the undertaking. The question of labour turnover was also involved, especially in wartime. Dr. MIDDLETON pointed out that special provisions would have to be made for those rejected from industry on the *x*-ray evidence of old tuberculous lesions.

BRONCHOSCOPY

At a recent meeting of a medical society of a sub-area of the British Expeditionary Force, with the president, Colonel F. WHALLEY, in the chair, Major C. T. BAKER-BATES read a paper on bronchoscopy, in which he described the work of the bronchoscopic clinic at the Royal Southern Hospital, Liverpool, during the last five years, in which period 937 examinations had been carried out by Mr. John McGibbon and himself. A follow-up system had been instituted and necropsies performed whenever possible.

Major Baker-Bates said that local anaesthesia combined with premedication was employed in almost all cases in adults, but in children avertin was used. The McGibbon bronchoscope was found to be very satisfactory. The patient's head was manipulated by a trained assistant; this was preferred to the use of Haslinger's head rest. The Bennett-Jones suction apparatus proved of great assistance. The symptoms or signs in the cases examined were recurrent haemoptysis, cough, expectoration, and dyspnoea of unknown origin, signs of pulmonary collapse and suppuration, signs suggesting the presence of new growths—both simple and malignant—and of foreign bodies. The commonest causes of bronchial occlusion in their series were bronchial carcinoma, simple new growths, and non-radio-opaque foreign bodies, which were all difficult to recognize clinically and radiologically and were frequently overlooked until the secondary changes in the affected lung had become permanent. Suppurative pneumonitis, lung abscess, and bronchiectasis were regarded not as separate diseases but as the end-result—that is, pulmonary suppuration—of many pathological processes, the primary cause of which in their cases had been most frequently found to be partial or complete bronchial obstruction. Bronchoscopy was therefore essential in all cases of pulmonary suppuration for determining the source and character of the pus, the primary lesion, and the presence or absence of any obstruction to drainage, upon which decision rational treatment depended. Suppurative lesions capable of drainage by bronchoscopic aspiration could be as adequately treated by efficient postural drainage carried out on a special bed of the Nelson type. A preliminary bronchoscopy was essential, however, before this line of treatment could be adopted. Repeated bronchoscopic aspiration with or without the instillation of antiseptics had not proved as efficacious in their hands as the results of some other workers had led them to expect.

Foreign bodies causing acute symptoms, continued Major Baker-Bates, formed less than 2 per cent. of their cases. A metallic foreign body such as a tack might remain in the larger bronchi for months without producing symptoms, but there was always the likelihood that it would move downwards into smaller bronchi and cause complete obstruction and its sequels. On the other hand, vegetable substances, such as peanuts, pips, or beans, quickly set up a vigorous irritative bronchitis, and if not removed or expelled resulted in severe symptoms, permanent lung damage, or death. As foreign bodies were liable to move, it was necessary to have a radiograph taken immediately before attempted removal. The lung damage in these cases improved beyond expectation provided the foreign body had not been allowed to remain in position too long. It was their impression that the inhalation of radiologically non-opaque objects was commoner than was generally appreciated, and that these were the primary lesions in many obscure cases which only presented signs of pulmonary suppuration. The symptomless period following inhalation of foreign bodies of the non-vegetable type might cause the possibility of such a body to be overlooked until the onset of pulmonary suppuration made investigation necessary.

They looked upon pneumonitis and unresolved pneumonia, he said, as pathological reactions on the part of the lung to partial bronchial occlusion by new growths, foreign bodies, or mucous plugs. All patients recovering from pneumonia should be radiographed before discharge. If any remaining shadow indicated delayed resolution a further *x*-ray examination should be made after fourteen days, and if the radiograph showed no appreciable change bronchoscopy was done without delay. It was only after a series of radiographs showing continuous improvement that the diagnosis of unresolved pneumonia could be substantiated.

Post-operative atelectasis followed bronchial obstruction from viscid mucus facilitated by the use of sedatives and belladonna after operation. If the condition did not respond to expectorants, carbon dioxide inhalations, and breathing exercises, bronchoscopic aspiration was carried out forthwith and instant relief of the condition followed. Simple new growths—angiomata, adenomata, and fibromata—were rare. Recurrent haemoptysis and symptoms and signs of bronchial obstruction were the reasons for these cases being referred to the clinic. Bronchoscopy afforded the only means of making an early and positive diagnosis of bronchial carcinoma—a common condition. In those cases not suitable for surgery, fragments of growth were removed with forceps, and radon seeds were inserted in order to establish a patent bronchial lumen which would permit of aeration and drainage of the affected areas of lung and so relieve bronchial obstruction and its sequels. Pulmonary syphilis was indistinguishable from malignant disease, and the two conditions might conceivably coexist. Repeated radiographic and bronchoscopic

examinations were carried out at intervals of three months, combined with intensive anti-luetic treatment.

In conclusion, Major Baker-Bates said that every large general hospital should have a bronchoscopic clinic under the care of a physician and laryngologist working in conjunction with a radiologist and thoracic surgeon; bronchoscopy should always be employed in pulmonary disease when other investigations had failed to establish a definite diagnosis; bronchoscopy in trained hands was a safe and harmless procedure, even in the presence of serious pulmonary disease.

Major A. S. H. WALFORD said that bronchoscopy was not used as much as it should be, because of lack of close co-operation between the physician and surgeon. Lieutenant-Colonel L. B. COLE asked what were the indications for bronchoscopy when sudden pulmonary collapse occurred in the course of an acute infection such as bronchopneumonia or asthma. Major G. SEED emphasized the danger of inhalation of septic material with abscess formation in the lung after operations on the nose and throat. Lieutenant-Colonel T. W. PRESTON was disturbed by the remark that atropine increased the tendency to collapse of the lung, and asked why this was. Major SCOTT described a case of post-operative atelectasis which he had treated while with the B.E.F. Sudden collapse of the right lower and middle lobes had occurred twenty-four hours after operation for hernia. At bronchoscopy he had found a large plug of mucus blocking the right bronchus at its bifurcation. Removal was followed by rapid clinical improvement, with profuse expectoration and re-expansion of the lung.

Major BAKER-BATES in reply agreed that team work was all-important. Bronchoscopy was a harmless procedure if proper care was taken. The bronchoscope should never be left down more than twenty-five minutes, and to obviate this risk he always had an alarm clock set in the theatre. In cases of acute pulmonary collapse the decision when to do bronchoscopy depended on the progress of the clinical and radiological signs. If there was no improvement after three or four days, then it should be done. Atropine predisposed to pulmonary collapse because it made the bronchial secretion tenacious.

OPHTHALMOLOGISTS IN CONGRESS

The annual congress of the Ophthalmological Society was contracted this year to a two-day session, but it was attended by some eighty members from all parts of the country, fifteen papers were read, and a morning was devoted to a special discussion on the choice of operation in glaucoma. One outstanding feature of the meeting was a demonstration by Sir Richard Cruise of a visor which he has devised for attachment to the steel helmet worn by fighting men. By a single movement it can be brought down over the upper part of the face and similarly can be retracted within the helmet. The mesh is such that, although exceedingly small missiles are prevented from entering the eye, the vision is limited only by a small degree. The congress unanimously passed a resolution expressing its belief that this visor would prevent the majority of cases of blindness caused by gunshot wounds and repeating with added emphasis its recommendation made in 1917 that some such visor should be generally adopted without further delay. This resolution was sent to the Admiralty, the War Office, and the Home Office.

It is impossible in a brief space to summarize all or indeed any of the papers, and allusion can only be made to one or two points which aroused interest. A paper by Mr. L. H. Savin on trachoma, in which he spoke of an apparent increase in the incidence of this condition in South London, led to an exchange of experiences in which contrasted opinions were expressed. For example, two Birmingham ophthalmologists declared that in their area in recent years they had hardly seen a fresh case, whereas a Coventry ophthalmologist referred to a little bunch of six. Mr. A. F. MacCallan mentioned that during the last few years he had seen ninety-seven cases of undoubted trachoma in this country; thirty of these were in people who had never been out of England and who had not, so far as they were aware, come into contact with any other sufferer; seventeen were British people who had lived abroad and had had opportunities of contracting the infection; thirty-six were German-Jewish refugees, and fourteen were persons of other nationalities. Mr. Harrison Butler said that in the cases which he was accustomed to see some years ago a surprising proportion were in Roman Catholics; he attributed this to the fact that many Roman Catholics placed their children in convents where they were taught by Irish nuns, and in Ireland the disease was endemic. On the other hand, an ophthalmologist from a seaport town with a large Irish element declared that there was no trachoma amongst them. A certain number of cases were reported from south-west Scotland; these fell into two groups, the larger consisting of the alien population (mostly Lithuanian and Polish miners) in Lanarkshire, and the smaller of natives of Glasgow.

Two of the papers read at the congress opened up interesting questions of sex-linkage and heredity in connexion with eye conditions. One of them was night blindness. Mr. W. J. B. Riddell mentioned a case in which a boy had been found to be night blind, and on investigation the condition was discovered in seven male relatives. Mr. Ransom Pickard described a small group in which colour blindness existed among certain members of one generation and night blindness in two females of the same generation, but these females had excellent colour vision. The colour-blind members of the family appeared to have inherited their defect from their paternal grandfather, in whom, however, it was only in a slight degree—a confusion of blues and violets. A point mentioned in the discussion was the frequency with which acuteness of colour vision is associated with acuteness of other special senses such as smell.

It is recognized that much better results are obtained in the treatment of phthisis when in addition to rest in bed and a sanatorium regime extensive but judicious use is made of collapse therapy. Support for this is contained in the report for the year ending March 31, 1939, of Dr. Peter Edwards, medical superintendent of the Cheshire Joint Sanatorium. During the year 426 patients were admitted, including 122 whose sputum was negative and twenty-seven observation cases. Patients selected for artificial pneumothorax numbered 192, for phrenic interruption eighty-seven, and for adhesion-section 123. Tubercle bacilli were "banished from the sputum" in all of the five T.B.+1 cases, in 67 per cent. of the 153 T.B.+2 cases, and in 34 per cent. of the 116 T.B.+3 cases—no mean achievement at an institution where culture of the sputum is carried out as a routine when no bacilli are detected in smears. Dr. Edwards is reluctant to attach the label "quiescent" to his patients: "As quiescent is difficult to assess," he states, "we put few in this class." This accounts for the fact that only one patient from the sputum-positive group was discharged as quiescent, though 98 per cent. of the T.B.+2 and over 40 per cent. of the T.B.+3 cases were discharged as improved. The paucity of words with which the work of the sanatorium is presented, the unimportance of some of the tables given—for example, those connected with body weight—and the introduction of second-place decimals in percentages relating to small numbers further tend to detract from sanatorium results that may be considered exceptional in this country. Particular attention must be drawn to the "statistics of ultimate results" in 4,025 patients discharged over a period of one to fourteen years, of whom only 2.4 per cent. have not been traced. The report also contains the findings of a comparison between the Vollmer patch and the Mantoux tests using purified protein derivative (P.P.D.). Contrary to some of the claims made by enthusiasts, it was found that the patch test cannot be depended on to detect all positive reactors, and that it was even not a desirable substitute for P.P.D. first strength. This investigation cannot carry full weight unless the authors publish the criteria that were adopted for a positive reaction in each of the tests.

Correspondence

Diphtheria Prophylaxis: Safe Milk

SIR,—I am directed by the President and Fellows of the Royal College of Physicians of London to request you to give publicity to the following resolutions which were passed unanimously at a meeting of the College on April 26:

(1) The Royal College of Physicians urges the Ministry of Health to encourage with all the authority at its command the immunization against diphtheria of children in the age group 1–15 by medical practitioners and by the staffs of all health authorities throughout the country, in view of the fact that there has been no abatement of diphtheria incidence or permanent reduction of mortality in England and Wales since the early years of the century. Further, in the opinion of the College, the cost of prophylactics required should not be allowed to interfere with or curtail the proper execution of schemes calculated to reduce so materially the incidence of diphtheria in the country. Where local outbreaks of diphtheria now occur the College recommends that advantage should be taken of the assistance of the expert staffs of the Emergency Laboratory Service to help to control by modern methods epidemics arising in those districts where such services are available.

(2) The Royal College of Physicians recommends that the attention of the Ministry of Health should be drawn to the fact that large numbers of children who have been brought up on pasteurized milk in the towns are now receiving raw milk in reception areas to which they have been evacuated, and that the Ministry should be asked to do all in its power to secure the co-operation of the Milk Marketing Board and of the medical officers of health to arrange for supplies of pasteurized milk to be made available in all areas where there are sufficient numbers of children to demand it. Further, in the opinion of the College members of the medical profession might usefully advise parents and guardians of children of the risks of infection which attend the consumption of raw milk, and of the value of pasteurization, or alternatively of boiling the milk, in removing these risks.

—I am, etc.,

London, S.W., May 1.

H. LETHEBY TIDY,
Registrar, Royal College of Physicians.

Treatment of War Hysteria and Neurosis

SIR,—The discussion on treatment of war hysteria and neurosis by the Psychiatry Section of the Royal Society of Medicine (*Journal*, March 23, p. 499) has come at an opportune time, and I should like to add a word or two. Attendance was impossible, as I have been temporarily attached to one of our larger general hospitals which has been operating for over two months in a forward area.

All the psychoneurotics who have been admitted to hospital in this immediate area have come under my observation, where I have been permitted to give full time to this work. That this work can be well carried out alongside of clinical medicine and surgery seems evident from our experience here, because 85 per cent. of my work has come direct to me from the medical and surgical specialists. The psychoneurotic conditions in these cases are associated with, superimposed upon, or following on organic lesions. That so close a liaison exists between my department and all the rest of the hospital has only been possible through the facilities given to me by my commanding officer and the excellent co-operation of the heads of the divisions and the specialists concerned. It means, in most cases, an earlier return of a patient to his unit. The value of sound neurological as well as good medical training is evident in my work here.

That the various types of treatment presented by the different speakers are effective has been our experience. Suggestion, persuasion, hypnosis, and what one might call a combination of Stekel and Hadfield in a very active reductive analysis have each or all had their place in my work, in which one has tried to fit the treatment to the patient rather than the patient to the treatment. The amnesias, aphonias, anaesthesias, and pareses have, on the whole, responded more rapidly in most cases to hypnosis, especially in understanding and releasing the underlying and emotional factors, as Dr. William Brown has stressed. Suggestion, hypnoidal suggestion, or persuasion is given afterwards. No great mystery has attended the hypnosis because the process has been explained to the patient first, and I have always found a ready co-operation.

The need for investigation and adjustment of the background of these cases as well as of the problems of the anxieties, so emphasized by Dr. Ross and Professor Culpin, has been most evident. In these cases active reductive analysis has been very effective. It appears to me that the authoritarianism of the Army makes this possible, whereas in civil life the lack of it means a more prolonged treatment.

Following the line of Hadfield's work in the last war, I have included mass suggestion in my treatment of all psychoneurotic cases. This is a daily procedure at 6.15 p.m., and it lasts about fifteen minutes. The patients relax on their beds, and after a few words to each about his own particular complaint general suggestions of complete relaxation and sleep are given. Many, I find, go into a hypnoidal state. Strong suggestions of cheerfulness, hopefulness, recovery, and refreshing and sound dreamless sleep are then made. A suggestion is given that these thoughts will occupy their minds as they go to sleep at night, and they are commanded to think them over and over again after going to bed until they fall asleep. The effect has been excellent. Sedatives are soon abandoned, and each patient thus gets some definite daily therapy that might otherwise be missed. With increased experience I anticipate a considerable extension of this form of treatment. For this reason, and because the spirit of the ward becomes one of good cheer and hopefulness, it is my opinion that these patients do much better when together than when left in wards where the other patients are physically ill or do not understand.

In a hospital situated as we are the most difficult problem of all is to decide just what to do with that not inconsiderable group Sir Arthur Hurst calls the "martial misfit." An illustrative case is one of a few I now have. The man came in as a case of severe acute anxiety obsessed with the idea that he was to be shot at dawn for desertion because he had overstayed his leave owing to illness in the family. He had completed his sentence of seven days' C.B., and was a free man, when he heard someone say he was classed as a deserter, after which he "cracked up." Persistent reassurance from his commanding officer was of no avail. His history reveals a childhood strongly conditioned to the fear of desertion by harrowing tales told of the last war by a drunken father. Now that he is again emotionally fairly stable and sleeping properly, is one to force him back to his unit as one might force a frightened child into the sea, or should he be transferred to useful work in the presumably more protected surroundings of the United Kingdom? If the latter is the right procedure, then where is one to draw the line in these cases? Dr. Crichton-Miller has presented the problem very clearly, but upon the shoulders of those of us who are in the forward areas rests the burden of a first decision about it. We see these patients at the beginning of their illnesses, and know much more about their primary reactions to the precipitating causal factor than anyone else can hope to know.—I am, etc.,

B.E.F., France.

P. L. BACKUS, M.D., D.P.M.

Economy with Efficiency in the E.M.S.

SIR,—As a critic of and grumbler against the organization of the Emergency Medical Service I would like to pay my tribute to the public-spirited members of the Central Medical War Committee for the time they have given to this task and the trouble they have taken, and would strongly urge those who, like myself, are profoundly dissatisfied with many of

the existing arrangements to read paragraph 16 of the Annual Report of Council (*Supplement*, April 20, p. 54), wherein they will read that the Central Committee is aware of the grievances, and is doing its best to get these anomalies remedied. As I note on page 55 that a reorganization of the E.M.S. is under review in June next, I would like to draw readers' attention to some points which affect the efficiency of the Service, and I am the happier to do so as no question of professional remuneration is involved. I refer to aid posts and mobile posts attached to hospitals.

In one hospital I know, for the aid post and the mobile post there are fifteen whole-time and thirty part-time workers. These persons—for "workers" is really a misnomer—have drawn pay since the beginning of the war and have not done a single job of work. Drivers paid on a full-time basis take it in turn to drive, and their arduous duties consist of driving a van on Saturday afternoon once a fortnight and also at an occasional practice. The full-time "nurses" sit in a room lit by electric light. They sit there all day, and then a night crew sit there all night: they read and sew. One of them told me it was far worse than work, and I can well believe it. These amateurs turned professional have only a theoretical knowledge of first aid, which may fail to help them if overcome by nausea or faintness at their first real job. Imagine having paid an attendant a full-time wage for a year, and then she faints at her first and only job! Adjoining this hall are the out-patient clinics with a staff of a sister and four nurses. If a raid took place the out-patient clinics (I am not referring to the separate Casualty Department) would, I am sure, cease work at once. A nursing staff with an actual, not theoretical, knowledge of dressings would be automatically available for the aid post.

I submit that a vast amount of public money would be saved and efficiency greatly increased if these aid posts were placed under the hospital authorities and staffed, as regards the nursing, by hospital nurses who during the period of waiting would be actually practising their profession instead of steadily degenerating from a standard initially low. A small subsidy to provide a small number of extra nurses, who would not be specifically attached to this task but do ordinary work provided the matron arranged to staff the aid post in an emergency, would be cheaper and more efficient. Arrangements for clerks to be available from the hospital office, who might receive a small retaining fee for mastering the necessary red tape, would deal with the administrative side. And drivers could be drawn from local taxi-drivers in an emergency. All taxi-drivers getting supplementary petrol might be required to be willing to do the work. They could, of course, be paid for any work actually done. In this way we would have trained nurses, trained drivers, and trained clerks at a fraction of the present cost. Volunteer unpaid workers for odd jobs could be enrolled who would promise to come to the aid posts if and when a raid occurred.—I am, etc.,

Hove, April 29. H. J. MCCURRICH, M.S., F.R.C.S.

The Thomas Splint in First Aid

SIR,—I was glad to see from Dr. Donald Stewart's letter (*Journal*, April 20, p. 670) that somebody else is wondering about the use of Thomas splints by first-aid parties. At the end of the last war the Thomas splint was recognized as the most useful splint to immobilize practically all fractures of the lower limb, and this, owing to the energy and teaching of Colonel E. M. Cowell, was applied as soon as possible. In order to make this possible, replacement Thomas splints and stretcher suspension bars were carried in motor ambulances not only belonging to the motor ambulance convoys but also in most of the field ambulances.

Now there are two schools: those who do and those who do not wish the Thomas splint applied before admission to the casualty clearing hospital. The objections of the second school are due to: (1) lack of efficiency of the first-aid parties; (2) loss of time in the application of the splint and getting the patient to hospital; (3) the question of the size of the splint. My reply to these objections is as follows:

1. Every first-aid party has a number of full-time paid personnel. These in the interval between games of darts could be instructed in the efficient and expeditious fitting of Thomas splints, so that they could each teach and take charge of a team comprised of voluntary part-time workers. At a practice air raid I have watched as a casual observer a St. John team putting on a Thomas splint. This team certainly knew its work, and I cannot say more than that, had I been the patient with a fractured femur, I should have had no objection to the splint being put on by them. The whole thing, including fitting to suspension bar, was certainly done in five minutes, probably less.

2. The few minutes used in applying the splint will delay the transit to the casualty clearing hospital. This objection savours of the panic obsession deplored by Wilfred Trotter in his posthumous article.

3. Three sizes are available—let the middle size be carried, and only the outsize man will be the outsider who has to go without.

My own feeling is that where the casualty clearing hospital is within a few minutes' ride the patient's limb should be fixed to the meshwork of the stretcher; but if the distance is several miles—then a Thomas should be applied. This lessens pain to the patient, for motor ambulances are notoriously shaky and stiffly sprung. One area commandant in this region has made the ruling that every first-aid party carries three Thomas splints and that each ambulance carries two suspension bars. I feel he is right.—I am, etc.,

Leamington Spa, April 30. G. G. ALDERSON, Group Officer, Coventry Area.

Co-operative Canteens

SIR,—I would suggest that the time has come when national and co-operative canteens should supplement uneconomic methods of home cooking. In modern warfare the morale and working capacity of the civilian population may be as important as the strength of the fighting forces. In this war, as in the last, people will be working ten and twelve hours a day; these will be chiefly the elderly men, the young people, and the women. No less than an army, a people works on its stomach. But after twelve hours' work a woman does not go home and cook a joint, two vegetables, and a pudding for herself and her children; she buys something (anything) at the shop round the corner.

It is true that not all women will be working; a number of them will stay at home to look after their children. Let us take an average sort of case, the wife of a private with three children aged 10, 8, and 6. Her total income is 36s. a week (39s. 6d. in the London area). She is faced, moreover, with a steadily increasing cost of living. Unless something is done to implement this income it is hard to see how she and her family will not be undernourished. For a generation now we have known what war babies are. They were "difficult" in the nursery, "neurotic" at school, and as young adults they are rather less robust than their seniors and juniors. We must now prepare for another generation of war babies.

I give below the comparative costs of a meal produced for four people and the same meal produced for a hundred:

Costed April 24, 1940.

	Meal for four		Meal for 100	
	s.	d.	s.	d.
Stewed lamb	1	4	17	9
Carrots, peas, and potatoes		10	13	6
Prunes and custard	1	1	8	2
	3	3	£1 19	5
	= 9¾d. per head		= 4¾d. per head.	

(These figures are for food, not counting fuel, labour, equipment, etc.)

Food is as much a weapon of war as ammunition. The present method of a hundred kitchens producing food for 400 people is as unprofitable as a hundred village smithies producing weapons for 400 soldiers. A scheme such as I suggest is not out of keeping with the English national character. It would be a development of the provision of meals in schools

and day nurseries. If people wished, they could take food home with them to eat. The canteens would, of course, be run on a non-profit basis, the charges being simply the cost of production. Such communal marketing and cooking would make the most of the rations available, cutting waste to a minimum. Incidentally, it would make rationing itself very much simpler. As doctors, I believe we should take an active part in organizing and encouraging some scheme of this kind.—I am, etc.,

London, W.1, April 29. E. HERZBERG.

Injection Treatment of Varicose Veins

SIR,—The interesting article by Mr. A. Dickson Wright (*Journal*, April 20, p. 665) has prompted me to write and discuss two procedures which I have adopted in the treatment of varicose veins. These measures, which I will describe below, are for the treatment of large veins only.

The average-sized varicose veins responded to the favourite solutions in common use to-day; but it is the large and tortuous veins which are the most difficult to occlude, and one often finds that unless the large trunk is occluded the injections given into its smaller tributaries do not have any effect whatsoever. It is therefore essential that, in order to obtain sclerosis in the veins, the parent trunk must first be injected and its lumen obliterated. To obtain this result I use what is known as the "twin injection." The "twin injection" consists in using two solutions—namely, quinine urethane and lithocaine (lithium salicylate 30 per cent., with tutocaine 1 per cent.). If these two solutions are mixed in a test-tube it is seen that immediately they come into contact with one another a glutinous precipitate is formed. The same effect results when the two solutions are injected inside a vein, resulting in a firm thrombosis. The procedure in using the twin injection can be applied in one of two methods, as described below.

The injection can be done single-handed. To do this three syringes are taken. Into the first 1 to 2 c.cm. of lithocaine is drawn up. The second syringe contains 1/2 c.cm. of sterile distilled water, and the third contains 1 to 2 c.cm. of the urethane solution. The needle is introduced into the vein and the lithocaine is injected. Leaving the needle *in situ*, the empty syringe is withdrawn and the syringe containing the distilled water is attached and a few minims of water are injected down the needle. Following this, the syringe containing the quinine urethane is attached to the needle (which is still kept *in situ*) and the solution injected, after which the needle is withdrawn. It is most essential that the two injections of lithocaine and quinine urethane should be interspersed with the injection of distilled sterile water, as otherwise occlusion of the lumen of the needle will occur.

The alternative method of giving the twin injection requires an assistant, and for this reason is therefore not so good a method in private practice. In this procedure the surgeon holds one syringe containing the lithocaine and his assistant holds the syringe containing the quinine urethane. The assistant first inserts his needle into the vein, and as soon as it is ascertained that he is within the lumen the surgeon puts his needle into the same vein one-half to three-quarters of an inch away from the assistant's needle. Having made sure that both needles are now inside the vein the two solutions are slowly injected.

In the numerous cases injected by the "twin" method I have had no complications. The thrombosis resulting has been firm and the smaller radicles have responded quickly to the subsequent injections.

The following procedure is one which I have used twice in the cases of saphenous varix with a positive Trendelenburg test. The results were so satisfactory that I would have no hesitation in using this technique in similar cases should they present themselves. The saphenous vein was exposed at its upper end by means of a two-inch incision made under local anaesthesia. The vein was clamped by two Spencer Wells forceps as high up as possible and cut through between the forceps. The upper stump of the vein was ligatured off. The forceps were removed from the lower part of the vein and its lumen exposed. Into the lumen a ureteric catheter was passed down the vein as far as possible. To the other end of the catheter a 10 c.cm. syringe containing sodium morrhuate was attached by means of a needle. The injection was slowly made down the ureteric catheter, the surgeon in the meantime slowly withdrawing the catheter until the last c.cm. of solution was injected close to the cut upper end of the saphenous vein. Immediately the catheter was withdrawn the vein was ligatured. The area of the operation was now swabbed freely with saline so as to wash away any sodium morrhuate which may have escaped from the catheter as it was withdrawn. The skin incision was then sewn up. By this technique a pipe-line thrombosis was produced down the saphenous vein, and all that was required was a few small injections into the smaller radicles at a later date.—I am, etc.,

Slough, Bucks, April 27. MAURICE LEE.

Schick Immunity

SIR,—Having been actively engaged in diphtheria immunization in the county of Aberdeen for the past five years, I have found Dr. J. F. Warin's article on Schick immunity (April 20, p. 655) of particular interest.

In denoting an individual as "Schick-immune" there is implied in the term two distinct conditions, one or both of which may be present in that individual—namely, (1) a certain minimum diphtheria antitoxin content circulating in the blood; and (2) the capacity of the tissues to respond immediately by the production of antitoxin when diphtheria toxin or antigen is introduced into the body. Glenny in 1925 stated that the presence of 0.01 unit of antitoxin per c.cm. of blood rendered an individual immune to diphtheria. Of the two conditions, however, the second of these is the more important and the true measure of protection against the disease. The antitoxin content of the blood can be easily and practically ascertained by a preliminary Schick test. A reliable indication of those naturally immune to the disease is a Schick-negative result in experienced hands. The capacity of the tissues to produce antitoxin in response to the introduction of an antigen is, on the other hand, not quite so easily measured, but can be estimated by repeated Schick tests at varying intervals. Schick tests of many sets of twins and members of large families all of school age and living under similar conditions have led me to the conclusion that this capacity of the tissues to produce antitoxin is an inherent individual and familial characteristic.

The Schick relapse rates after an attack of diphtheria mentioned show considerable variation. Of the 14,934 school children I Schick-tested in Aberdeenshire during the years 1935–7, 745 had had a previous history of diphtheria, and of these, 293, or 39.3 per cent., were found to be Schick-positive. Kinloch, Smith, and Taylor (*J. Hyg.*, 1927) reported 41 per cent. of positives among 105 persons Schick-tested after an attack of the disease. These relapse-rate results bear out observations and conclusions made by Schick (1911) and others working on the antitoxin content of blood after an attack of diphtheria that antitoxin (1) is usually produced by an attack of diphtheria, (2) does not develop immediately after recovery and in certain circumstances tends to die out after several months, and (3) was most pronounced in convalescent carriers and chronic cases.

The primary and secondary stimulus theory in the production of Schick immunity does not account for all Schick relapses, as, of the 745 above-mentioned diphtheria cases who were Schick-tested, ten had had two attacks of the disease, and three of these were found to be Schick-negative and seven still Schick-positive. It would appear, then, a type of individual exists whose antibody-production mechanism fails to respond to or is only very slightly stimulated to antibody formation by repeated attacks of diphtheria.—I am, etc.,

Aberdeen, May 2. J. S. WALKER, M.D., D.P.H.

Kidneys and Sex Hormones

SIR,—In an article on kidneys and sex hormones by Korenchevsky and Ross (April 20, p. 645) the authors suggest that oestrogens would probably increase the pathological changes in females with kidney disease. The case history given below is of interest in this connexion.

The patient came under my care in November, 1938. She showed mental symptoms of a nature pointing to organic disease and was discovered to have active nephritis, parenchymatous in type and of tubular and glomerular distribution. Dr. Gibson, pathologist to the Mineral Water Hospital, Bath, found on examination unmistakable signs of tissue damage, with hyaline, granular, and epithelial casts. Red cells and renal epithelial cells were also present. Albumin in the urine reached the level of 2 grammes per litre. Her blood pressure was 198/108. During January, 1939, she had symptoms of suppression, often passing no more than 6 to 10 c.cm. of urine daily. Her diastolic blood pressure remained high. During the first six months of 1939 she became quiet and retarded, and mental symptoms were less dramatically displayed, but physically she deteriorated alarmingly. She was 9 st. 8 lb. on admission, and in the following eight months, at the end of July, 1939, she had fallen to 6 st. 2 lb. In July she had an exacerbation of mental symptoms and was in very poor physical health.

Towards the end of August she was put on Schering's progynon tablets, 1,000 units, one tablet being given b.d. Because of her improvement in all spheres the dose was increased steadily to 12,000 units daily. Her mental condition has improved very markedly, but a fact of more importance in the present connexion is that her physical health has shown a steady but unmistakable amelioration. Her weight has reached 7 st. 7 lb. Urine examination by Dr. Gibson on April 25, 1940, shows no evidence of renal disease—the albumin, casts, red cells, and renal epithelial cells previously noted being no longer present.

The above conveys at the very least that the female hormone used could have no harmful effect on kidney tissue which had previously sustained damage. The matter needs much closer and more prolonged investigation, but I would suggest that the therapeutic application of a valuable product like oestradiol should not necessarily be withheld from the human female with kidney damage because of deleterious effects induced in the kidneys of rats.—I am, etc.,

Bath, May 2. A. GUIRDHAM.

The Suprapineal Arachnoid Body

SIR,—In the *Journal* of March 23 (p. 476) Professor W. E. Le Gros Clark describes an interesting structure which he has found in the human brain, projecting upwards into the floor of the straight sinus where the latter is joined by the great vein of Galen. This structure, he thinks, provides a ball-valve mechanism whereby the venous return from the third and lateral ventricles may be impeded. While he admits that this conclusion regarding the possible function of the structure must be regarded as tentative in the absence of supporting clinical and experimental evidence, he nevertheless goes on to say that "the capillary pressure within the choroidal plexuses of the third and lateral ventricles will respond to a regulation of the venous return through the vein of Galen, and this again will exert a direct effect on the secretion of cerebrospinal fluid." It would be interesting to know on what evidence Professor Clark bases this assertion.

In an extensive series of animal experiments (*Brain*, 1934, **57**, 1; 1934, **57**, 255; 1936, **59**, 324; 1937, **60**, 211; 1938, **61**, 62) I have failed entirely to obtain evidence that the formation of cerebrospinal fluid is influenced in any way by retarding the venous return through the great vein of Galen. Moreover, I am unacquainted with any published work which after examination may be regarded as lending support to this view. I would therefore urge that any claim that the formation of cerebrospinal fluid can be modified in this manner should be regarded as speculative until the necessary evidence be forthcoming.—I am, etc.,

Manchester, May 1. T. HENRY B. BEDFORD.

Neuritis following Rubella

SIR,—Having recently read the histories of a large number of cases of rubella, I can confirm that symptoms similar to those described by Dr. Beryl L. Harrison in her letter (April 13, p. 637) have occurred not infrequently in the recent epidemic of cases diagnosed as rubella. An empirical theory suggested itself to me as follows. The differential diagnosis between rubella and scarlet fever is not always easy. Scarlatina is a symptom of a streptococcal infection which later may also produce the symptoms of acute rheumatism. Is it not therefore possible that the "neuritis" is actually "acute or subacute rheumatism" associated with a streptococcal erythematous rash misdiagnosed as the ubiquitous rubella? It is also not irrelevant to remember that sulphonamide drugs can produce both skin rashes and "neuritic" symptoms.—I am, etc.,

Greenford, April 25. ALISTAIR FRENCH.

War and the Medical Services

SIR,—Your correspondent "M.R.C.P." (May 4, p. 743), writing as "one of the under-30's," has either forgotten or is not aware of many important facts. This country is at war, and his career as a doctor is no more of vital importance than that of the millions of other men who also have voluntarily, or under compulsion, sacrificed their prospects. Secondly, knowledge of medicine is not the only essential in the Forces. Other essentials are knowledge of men, of organization, ability to co-operate with other branches of the Forces, knowledge of medical boards and their routine, of regrading, and a multitude of things that can only be learned by experience.

Does your correspondent think it just that young and very often theoretical M.R.C.P.s and F.R.C.S.s should be in control of experienced G.P.s many years their seniors, married men, who have sacrificed, like myself, large single-handed practices and who have had experience in the handling of their fellow-men gained in years of practice?—I am, etc.,

May 4. LIEUTENANT, R.A.M.C.

Medico-Legal

A DOCTOR'S CONCEALMENT OF BIRTH

Dr. Arthur James Daly of Ilkestone, Derbyshire, was acquitted at the last Nottinghamshire Assizes of murdering a newly born child. The mother was a young woman who had been a patient of his and with whom he had had a liaison. He attended her at the child's birth and hid its body in a box in a caravan bungalow which he rented. Giving evidence against him, Dr. J. M. Webster, director of the West Midland Forensic Science Laboratory, said that the child died from asphyxia from swabs having been forcibly pushed into the mouth. The doctor, however, though he admitted intimacy with the mother, said that when the child was born the mother had a severe haemorrhage, and he was forced to give her all his attention. When he returned to the baby he found no sign of life, and tried artificial respiration without success. Finding that the baby was dead he wrapped it in cotton-wool, placed it in his bag, and took it about with him in his car for two days. Sir Bernard Spilsbury said that the asphyxia could have been caused by a patent ductus arteriosus. Apart from a bruise on the child's tongue, that congenital defect would account for all the conditions of the child's body. The wads of cotton-wool in the mouth could have got there after the child was dead.

A Nominal Sentence

The jury found Dr. Daly not guilty of murder, but guilty of concealment of the child's birth. Mr. Justice Oliver, in passing sentence, said he had decided not to send the doctor to prison. He had stood in the dock in peril of his life and had

been most properly acquitted of murder. His Lordship added that he did not believe the doctor had any hand in killing the baby, though he had taken it away and hidden it for reasons which could be understood even if they were not forgivable by law. Moreover, the doctor would have to be dealt with by his own profession. He could not help but think that the doctor had had a lesson he would never forget. He awarded three days' imprisonment, a sentence which, as the defendant had been in custody for fifteen weeks, meant his immediate discharge.

A JUDGE PRAISES A HOSPITAL

In trying a running-down action at Leeds Assizes, Mr. Justice Croom-Johnson[1] paid a tribute to hospitals in general and to the Nottingham General Hospital in particular. The action was brought by a man and his wife who had been injured when the car in which they were riding collided with an eight-wheeled motor lorry; they sued both drivers. The injured man was in Nottingham General Hospital for five months, and at first his life was despaired of. He had numerous cuts and lacerations of the scalp, face, arms, hands, and legs, and a compound fracture of the right thigh, for which at the time of the action he was wearing a calliper splint. His right eye was displaced, and it was feared that his limitation of vision might be permanent. It used to be part of his duties to view films, but he could no longer watch one for longer than a few minutes. The judge awarded him £4,550 damages and his wife £1,000. His Lordship said that the saving of this patient's life by the staff of the hospital was little short of a miracle. It showed the great debt which the public owed to hospitals and to that one in particular. Officers of the hospital might justifiably remember this patient with pride for what they had been able to do for him.

A HARDSHIP OF BILLETING

The billeting of evacuated persons on householders in reception areas is a regrettable enough invasion of privacy, but a recent decision of the High Court adds to its burdens. A householder was served with a billeting notice requiring her to receive two children. They were at that time in quarantine after suffering from diphtheria. She refused to receive them, and appealed to the appropriate tribunal. Before the appeal could be heard the billeting officer prosecuted her. The magistrates considered that her appeal stayed the operation of the billeting notice; that since she was aggrieved and had complained to the tribunal the notice did not become operative until the complaint had been determined, and therefore she was not guilty. This must surely appear to most readers to be no more than common sense. The King's Bench Divisional Court, however, held otherwise.[2] Mr. Justice Hawke said that the regulations might show some signs of having been prepared in haste, but their meaning was perfectly clear. If a person failed to comply with the billeting notice he was guilty of an offence, whether he appealed or not. His lordship suggested that the Government may have to consider the greatest good of the greatest number: hardship might result if a notice was given and persisted in, but it might equally result if billeting was delayed pending an appeal. Mr. Justice Charles pointed out that there was no time limit for an appeal. The policy of the regulations, he said, was quite clear: to put tens of thousands of children into safety. In doing so someone might be asked here and there in unfortunate circumstances to give housing-room to children. Their lordships sent the case back to the magistrates to deal with afresh—not with a direction to convict.

On the wording of the regulations they obviously could not have come to any other conclusion, but the facts of this case call very strongly for a modification of that wording.

[1] *Manchester Guardian*, March 8.
[2] Mee *v.* Toone: 1940, 2 All E.R., 155.

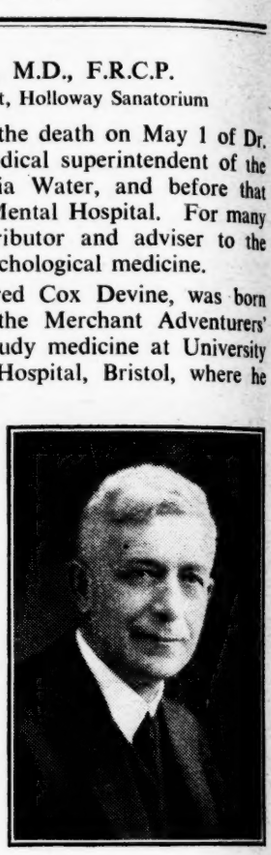
Obituary

HENRY DEVINE, M.D., F.R.C.P.

Late Medical Superintendent, Holloway Sanatorium

We much regret to announce the death on May 1 of Dr. Henry Devine, until lately medical superintendent of the Holloway Sanatorium, Virginia Water, and before that in charge of the Portsmouth Mental Hospital. For many years he was a valued contributor and adviser to the *British Medical Journal* in psychological medicine.

Henry Devine, son of Alfred Cox Devine, was born on May 2, 1879, and from the Merchant Adventurers' School, Bristol, went on to study medicine at University College and at the General Hospital, Bristol, where he served as house-physician after taking the English Conjoint qualifications in 1902. He was an outstanding student at Bristol, and continued his education at Munich and at King's College, London. At the M.D. examination of the University of London in 1909 he won a gold medal in mental diseases, and in the following year received the M.D. degree of the new University of Bristol. He became M.R.C.P. in 1906, and was elected F.R.C.P. in 1919.



Devine's early interest in psychology led him to enter the L.C.C. asylum service at Long Grove Hospital; this was followed by appointment as senior assistant medical officer at the West Riding Asylum, Wakefield, and after that medical superintendent of the Portsmouth Corporation Mental Hospital (now St. James Hospital) at Milton, whence his reputation spread far and wide. This institution housed military patients during part of the last war, and its superintendent was appointed consulting psychiatrist to the Royal Victoria Hospital, Netley, with the temporary rank of captain R.A.M.C., and received the O.B.E. in 1919 for his services. He was associated for many years with the Maudsley Hospital as lecturer in psychology, and the Royal College of Physicians appointed him an examiner for the Diploma in Psychological Medicine. At the Liverpool Meeting of the British Medical Association in 1912 Devine was honorary secretary of the Section of Neurology and Psychological Medicine, over which he presided in 1923 when the Association met in Portsmouth; and at the Centenary Meeting in 1932 he was vice-president of the Section of Mental Disorder. He was also a past-president of the Section of Psychiatry of the Royal Society of Medicine. In 1909 he had received the Gaskell gold medal and prize of the Royal Medico-Psychological Association; he became assistant editor of the *Journal of Mental Science* in 1916, and co-editor from 1920 to 1927.

In 1929 he published *Recent Advances in Psychiatry*, which formed a noteworthy addition to this well-known series. The outstanding feature of this book was its author's widely comprehensive survey of the subject and his search for a common factor in each of the numerous theories advanced towards a fuller understanding of

mental disease. He impressed on his readers the need for keeping in mind that the psychoses, like normal reactions, are the product of a number of mutually interrelated factors, both psychic and organic, and he demonstrated the various relationships existing between disordered states of mind and such factors as a psychopathic heredity, metabolic disturbances, organic diseases, obscure infections, endocrine disorders, and morbid changes in the cells of the brain. A second edition appeared in 1933 with many improvements and additions and in a somewhat rearranged form.

Henry Devine was not only a very able and enlightened administrator and man of intellect, widely read in all parts of his subject; he was deeply concerned for the patients under his care as fellow men and women in adversity. He had a singular gift of understanding, and radiated sympathy to those for whom he worked and those who worked with him. It can truly be said that he spent himself in the service of the mentally afflicted and in the advancement of psychological medicine both as a science and as a branch of the healing art.

[The photograph reproduced is by Elliott and Fry, Ltd.]

H. P. HAWKINS, D.M., F.R.C.P.

Consulting Physician to St. Thomas's Hospital

Dr. Herbert Pennell Hawkins, who died at Amiesmill Farm House, near Horsham, on April 16, was born in 1859 at Lamberhurst, where his father, the Rev. Robert Hawkins, was vicar. From Eton, where he was a King's scholar, he went on to Pembroke College, Oxford, with a scholarship. He gained first-classes in Classical Moderations and in Natural Science, graduated M.B., B.Ch. in 1887, and won the Radcliffe travelling fellowship, which took him for three years to Vienna. At St. Thomas's Hospital he held a number of house appointments before taking the M.R.C.P. in 1889, proceeding to the M.D. and being elected F.R.C.P. in 1894. He was appointed dean of the medical school in 1896 and soon afterwards lecturer in medicine and assistant physician to the hospital. During the last war, when St. Thomas's became No. 5 General Territorial Hospital, Hawkins was commanding officer with the rank of lieutenant-colonel (later brevet colonel), and for this service was created C.B.E. On retiring from the full staff of St. Thomas's he was elected consulting physician and went to live in Sussex.

Sir Cuthbert Wallace writes:

There are not many left who grew up with Hawkins, but the qualities of the man remain a clear memory with those who were first his pupils and eventually his junior colleagues. Very few people were endowed as he was. He had all the mental attributes to appraise the value of new ideas and put them to the best use. Many people have good brains but lack the ability to express their ideas clearly and succinctly. Hawkins had this power not only when it came to writing but in lecturing and demonstrating. His ability to make diagrams either on paper or with the chalks enabled him to impart what he wished to his classes, and after a demonstration his students had a clear and concise knowledge of the matter in hand. Although to a point a dogmatic teacher, Hawkins was always fully alive to the possibility that what seemed true to-day might be upset to-morrow, but he recognized that the young student requires a firm foundation and that the pros and cons were a matter for the more senior folk.

His work on appendicitis was a classic, and it is unfortunate that much that he wrote never saw the light, for he would abandon a subject after he had put quite a lot on paper. In fact his temperament was that found in many brilliant people who can do things so easily that they pass from one subject to another as the mood moves them. There came a time in his career when the ball was at his feet. His advice was widely sought and highly appreciated and valued. Then he seemed to tire, and sought a peaceful night by disconnecting his telephone. The writer of this was a senior surgical house officer when Hawkins was at his zenith, and it fell to his lot to do surgical work for him from time to time. Memory brings back the clear statement of the case that was made and the great interest shown as, surrounded by his class, he watched the proceedings. Memory also brings back the dapper figure, his fresh face and happy smile.

When the last war came he assumed the post of O.C. to St. Thomas's war hospital. He entered on this new phase of his life with enthusiasm—it almost seemed that the break was very welcome. He never again engaged in practice. He went to the country and took up a country life with zest, and remarked one day that no day was long enough to do what had to be done. It may be said that the enthusiasm for such a life lasted longer than any other.

There must still be many doctors about that thank him for what he taught, how he taught, and for the advice and help he gave.

SIR GILBERT BARLING

Dr. R. Allan Bennett writes:

The memories of many of his old students and house-surgeons will be stirred by the obituary notice of Sir Gilbert Barling—meagre and tepid catalogue of academic virtues as it is. It gives no hint of the man himself, nor of the awe and affection he inspired in his followers and patients. I remember his first lecture after his appointment as professor (or was it only lecturer?) in surgery to the Birmingham School—an appointment that roused to frenzy the feelings of those of us who followed his great rival Mr. Jordan Lloyd. We were prepared to make things as awkward for him as we could, but one glance of that pontifical eye quelled the tumult almost before it was born.

Mr. Barling often came with his friend Bertram Windle to my father's house, and there, with George Brewerton, he delighted us with music and with song. He was a fine actor—indeed, I always thought of him linked with Squire Bancroft, whom he resembled not a little—and for years was a pillar of the Kyrle Society, and would sing, "Ah me! I was a pale young curate then," with great effect. His great quality was, I think, benignity. I never saw him ruffled; never knew him discourteous to a nurse or a resident. He was a great man and a great gentleman, and I like to offer this small tribute of affection to his shade.

We record with regret the death at Cheltenham on April 17 of Dr. CLARENCE BRIAN DOBELL, who had been a member of the British Medical Association since 1893. Dr. Dobell graduated M.B., C.M. at Edinburgh in 1893, M.D. (commended for thesis) in 1904, and became F.R.C.P.Ed. in 1918. He also took his M.R.C.S., L.R.C.P., London, in 1894, studying at Edinburgh University and St. Bartholomew's. He first went to Tewkesbury Hospital and became assistant surgeon there, but he soon settled in Harrow, where he had an extensive practice. Early in 1915 he became medical superintendent, with the rank of lieutenant, R.A.M.C., of the Segregation Camp at Crown Hill, Egg Buckland, near Plymouth, where he did valuable work on cerebrospinal fever. Later in the year he went to the large prisoners of war camp at Stobs, in Scotland, to be principal medical officer, with the rank of major. Under his supervision the camp grew until it accommodated 1,200 prisoners, and was regarded as a model, not only for the treatment given there but also for the appearance of the camp, with grass and flower-beds where originally there had been nothing but rough and boggy hillside. Dobell left the Army at the end of the war and joined the medical assessors staff on the Ministry of Pensions in the autumn of 1919. A few months later he became Deputy Commissioner of Medical Services, Assessor for the Scotland Region of the Ministry of Pensions, his work covering the whole of Scotland. He carried

out any work he undertook with the completeness and efficiency which was his ideal, and with that originality which was so characteristic of him in all departments. He was a fine horseman, hunting regularly whenever opportunity offered, a first-rate shot, and a great country-lover. In his later years his chief relaxation was in taking country rambles, where very little of Nature escaped his observant eye. He was a great reader, and those who knew him well appreciated the wide scope of his reading and his unusually retentive memory. He rarely failed to provide an answer to questions on subjects so diverse as geology and comparative religion. With all these qualities he combined a keen sense of humour and a ready fund of anecdote; he was as delightful a visitor as he was a host. For the last two years Dobell's health had caused anxiety, in spite of periods when he was able to resume his normal activities. He bore the suffering and distress of his illness with unfaltering courage, and with meticulous consideration for those around him. He will be greatly missed by a very large number of friends.

We regret to announce the death at the age of 86 of Professor PIERRE MARIE, the eminent Paris neurologist, who first described acromegaly (1886), progressive muscular atrophy of the Charcot-Marie-Tooth type (1886), pseudo-hypertrophic pulmonary osteo-arthropathy (1890), congenital cerebellar ataxia (1893), rhizomelic spondylosis (1898), and cleido-cranial dysostosis (1898). He was also the author of a work on diseases of the spinal cord (1892), which, like his articles on acromegaly, was translated into English in the New Sydenham's Society's publications. In 1906 appeared his three sensational and iconoclastic papers in the now defunct *Semaine Médicale*, in which he denied that the third left frontal convolution played a special part in the function of language. He was elected professor of morbid anatomy in 1907 in succession to Cornil. His work at the Bicêtre infirmary made that establishment almost as famous as La Salpêtrière had been made by Charcot, whose most brilliant pupil he had been. His most important papers were collected in *Travaux et Mémoires* (1926 and 1928). Professor Marie was a Commander of the Legion of Honour, and was elected an Honorary Fellow of the Royal Society of Medicine in 1896 when that body was the Royal Medical and Chirurgical Society of London.

Universities and Colleges

UNIVERSITY OF OXFORD

The summer dinner of the Oxford Graduates' Medical Club will be held at Magdalen College on Friday, June 28, at 7.45 for 8 p.m., with Dr. W. D. Sturrock in the chair.

UNIVERSITY OF CAMBRIDGE

Final M.B. Examination

The dates of examination of candidates for the Final M.B. are as follows: Part I (Surgery, Midwifery, and Gynaecology), June 11, 14, and 15; Part II (Principles and Practice of Physic, Pathology, and Pharmacology), June 12, 13, 17, 18, 19, 20, and 21.

UNIVERSITY OF LONDON

The following appointments to the Senate for the period 1940–4 have been made:

FACULTY OF MEDICINE.—Professor F. R. Fraser, M.D., F.R.C.P. (reappointed).

GENERAL MEDICAL SCHOOLS.—Sir Charles Wilson, M.D., F.R.C.P. (reappointed).

CO-OPTED BY SENATE.—Viscount Dawson of Penn, P.C., G.C.V.O., M.D., F.R.C.P. (reappointed).

ROYAL COLLEGE OF SURGEONS OF ENGLAND

Lord Athlone an Honorary Fellow

The Earl of Athlone paid a visit on April 30 to the Royal College of Surgeons of England to receive the diploma of Honorary Fellow of the College. He was received by the President, Mr. Hugh Lett, and the Vice-Presidents, Sir Robert Kelly and Sir James Walton, and had lunch in the College with the members of the Council. After lunch he signed the Roll and was admitted formally to the Honorary Fellowship.

In presenting the diploma the President expressed appreciation of all that the Earl of Athlone has done for the country and the Empire, of his success in South Africa, and his forthcoming post of Governor-General of Canada. He paid tribute to his interest in education, particularly postgraduate medical education, nursing, and the hospitals. In the Royal College of Surgeons he has been a Trustee of the Hunterian Collection for seventeen years, he performed the opening of the Bernhard Baron Laboratories in December, 1937, and has been present at Hunterian Festivals. Finally the President pronounced the words of admission: "In the name of and by the authority of the Royal College of Surgeons of England I hereby admit you an Honorary Fellow thereof."

Lord Athlone in reply expressed his gratification at receiving the Honorary Fellowship. It was a source of particular satisfaction to him, as he had been associated with members of the Council and other Fellows of the College in his activities connected with hospital administration, nursing, and post-graduate teaching. He had become a Trustee of the Hunterian Collection at the time when he was Chairman of the Middlesex Hospital, a member of whose staff, Dr. William Hunter, had been instrumental in bringing his brother John Hunter to London.

The following were present at the luncheon, in addition to Lord Athlone, the President, and Vice-Presidents: Sir Cuthbert Wallace, Mr. W. Sampson Handley, Mr. A. H. Burgess, Mr. Victor Bonney, Mr. G. Grey Turner, Sir Alfred Webb-Johnson, Surgeon Rear-Admiral G. Gordon-Taylor, Colonel Sir Charles Gordon-Watson, Mr. R. C. Elmslie, Mr. H. S. Souttar, Sir Girling Ball, Mr. W. H. Ogilvie, Surgeon Rear-Admiral Cecil P. G. Wakeley, Mr. L. E. C. Norbury, and Mr. Cecil A. Joll, Members of Council; Mr. Kennedy Cassels, Secretary; Mr. Horace H. Rew, Director of Examinations; and Mr. W. F. Davis, Assistant Secretary.

Lectures on Applied Physiology

On May 2 the Royal College of Surgeons inaugurated a new series of lectures on physiology as applied to medical and surgical problems. The first lecture was given by Professor R. J. MacDowall of King's College, London, on "The Circulation in Shock." This was followed on May 9 by a lecture by Professor E. D. Adrian, F.R.S., of Cambridge, on "Pain," and on May 16 Professor A. D. Macdonald of Manchester will lecture on "Spinal Anaesthesia." These lectures are designed to bring the results of laboratory investigations to the attention of clinicians and senior students of medicine.

CONJOINT BOARD IN SCOTLAND

The following candidates, having passed the final examination, have been admitted L.R.C.P.Ed., L.R.C.S.Ed., and L.R.F.P. & S.Glas.:

M. Aly, Mary C. Clay, M. Coken, J. H. C. Corr, W. P. Forrest, R. H. Georges, A. N. Godholm, J. C. Greenfield, D. B. Handelman, G. I. Heron, Ellen B. Ho-A-Yun, H. Holzer, E. Iskander, G. Iskander, M. Kanagaratnam, P. J. McGinley, A. E. McKay, A. J. MacQuillan, D. I. C. Milton, S. H. Myers, J. G. Palin, L. Phillips, C. M. Ramakrishna, W. Rapoport, E. Z. T. Salama, J. H. P. Stewart, W. F. J. M. Thom, B. C. Weerappah.

The following graduates of recognized universities, having passed the final examination, were also admitted L.R.C.P.Ed., L.R.C.S.Ed., L.R.F.P. & S.Glas.:

H. G. J. Herxheimer, E. Hohenberg, E. C. Kalmar.

The number of deaths reported to London coroners in 1939 was 9,158, inquests being held in 3,172 cases. The number of suicides, 552, was forty-two fewer than in 1938; of the number, 187 were of persons over 60 years of age. People who met their deaths by accident numbered 1,750, or 157 more than in 1938; sixty deaths resulted from injury, and fifty-seven from drowning; in three cases a verdict of murder was returned, in four cases a verdict of manslaughter, and five inquests were held in connexion with executions. A verdict of "death from natural causes" was returned in 519 cases, and there were nine verdicts of "cause of death unknown." Twenty-four deaths of newly born children were found to be due to want of attention at birth. The number of deaths due to excessive drinking was seventy-seven.

Medical Notes in Parliament

The Royal Assent was given on April 25 to the Royal Society for the Prevention of Cruelty to Animals Act and to the King Edward VII Welsh National Memorial Association Act.

Provisional regulations, dated April 25, 1940, made by the Minister of Health under Sections 98 and 99 of the National Health Insurance Act, extending the period of office of the present members of the Panel and Pharmaceutical Committees, were presented to Parliament on April 30.

The Colonial Development and Welfare Bill was introduced by Mr. Malcolm MacDonald on May 2.

Previous Service and Present R.A.M.C. Rank

Mr. STANLEY stated on April 25 that previous commissioned service in other branches of the Army would not be reckoned as equivalent to previous commissioned service in the R.A.M.C. in fixing the present rank of officers in that corps. Such service was taken into consideration when R.A.M.C. officers were selected to fill appointments carrying acting higher rank.

Workmen's Compensation

In the House of Commons on April 30 the Workmen's Compensation (Supplementary Allowances) Bill was read a second time. Sir JOHN ANDERSON said that the Government had been in discussion with representatives of industry with a view to devising a temporary scheme for meeting cases of hardship. No argument in favour of an all-round increase could be based on any change in conditions since the present rates were fixed by the Act of 1923. The Bill would provide substantial new benefits, in respect not only of accidents occurring in the future but of those which had happened in the past. Every case in which an additional allowance would be given was one in which hardship might be presumed. There would be no means test, and it was hoped to avoid anything in the nature of vexatious inquiry. A Labour amendment, objecting to the Bill because it was limited to a system of supplementary allowances in respect of wives and children, excluded any provision for single men and women, and failed to recognize the necessity for an immediate all-round increase in the rates of compensation payable, was negatived.

Industrial Health Research

Sir JOHN ANDERSON assured Mr. Ridley on April 30 that his attention had been drawn to Emergency Report No. 1 of the Medical Research Council Industrial Health Research Board. The Home Office was represented on the Industrial Health Research Board, and he called attention to the importance of this report in a reply on April 18 to Sir Ernest Graham-Little. Action on the recommendations was a matter for all those who were responsible for the organization and management of industry, but the Home Office was taking steps to ensure that the report should be made widely known, and the factory inspectors would continue to do their share in securing that progress was made in those matters which fell within the provisions of the Factories Act, such as lighting, ventilation, temperature, and safety precautions.

Silicosis among South Wales Miners

On April 30 Mr. J. GRIFFITHS asked the Secretary for Mines if he was aware that during 1939 ninety-one miners were certified to have died of silicosis and 355 certified to be disabled by the disease in the South Wales coalfield. Mr. LLOYD said he was aware of the position as regards silicosis among miners in South Wales, and his Department was collaborating fully with the Medical Research Council in the large-scale investigations being made there. Inspectors were continuing to promote the adoption and improvement of a variety of methods for the prevention and suppression of dangerous dust, and an additional inspector attached to the staff at the Mines Department had been appointed to devote his whole time to giving further help in dealing with the difficult technical problems involved. Mr. GRIFFITHS asked if it was proposed that these representatives should issue a separate report on the preventive measures which might be necessary. Mr. LLOYD replied that, with regard to the Medical Research Council investigation, he thought, subject to advice, that was so. Captain WATERHOUSE informed Mr. Griffiths that the investigation into the problems presented by industrial pulmonary disease among coal-miners had continued to make satisfactory progress. The field work was now nearly finished, and it was hoped to complete an interim report on the results during the summer.

Hospital Treatment for A.T.S. Members

On May 7 Mr. STANLEY informed Sir Alfred Knox that members of the Women's Auxiliary Services serving with the Army might be admitted to any military hospital when accommodation was available, any military families hospital, or any of the Emergency Medical Service Hospitals of the Ministry of Health under the same conditions as Army personnel. Sir ALFRED KNOX asked Mr. Stanley if he would not agree that the accommodation for these people in London was insufficient, and why the War Office refused the offer of the Gordon Hospital in Vauxhall Bridge Road, which was newly built and up to date. Mr. STANLEY said he was not aware of this, and would look into it. Mr. Stanley further stated that no convalescent home had been arranged for the use of Women's Auxiliary Services serving with the Army, but the question of the provision of convalescent depots was under consideration.

State Medical Service

On May 7 Mr. GROVES asked the Minister of Health if he would consider the preparation of a scheme for a State medical service for all citizens to operate after the war; and whether, in this connexion, he would consult the British Medical Association, the Medical Practitioners' Union, the Medical Women's Federation, and the Medical Officers of Health Association, and appoint a Departmental Committee to inquire into the matter. Dr. ELLIOT: I do not think the present time is opportune for consideration as suggested.

Enlistment in the R.A.M.C.—Mr. OLIVER STANLEY told Mr. J. Griffiths on April 30 that the minimum age limit for enlistment in the R.A.M.C. for men who possessed an R.A.M.C. trade qualification was 20 years, and had been so since mobilization. Not all R.A.M.C. trades had been open to recruitment continuously, but various trades had been opened and closed according to the requirements of the corps.

Encephalitis following Vaccination.—On April 30 Dr. ELLIOT told Mr. Groves that six cases of encephalitis following vaccination came to the notice of his Department during 1939, of whom three were serving soldiers.

Advertisements in Books of Stamps.—Sir ARNOLD WILSON asked on May 1 whether the Postmaster-General, in view of the increased revenue now derived from the sale of stamps, would arrange to discontinue advertisements in postage-stamp booklets of appeals to the public to spend money on alleged remedies and appliances which the British Medical Association disapproved. He said all responsible medical authorities deplored the publicity so given. Mr. W. S. MORRISON answered that, in view of the heavy expenditure on national services, he was not prepared to give up the revenue derived from these advertisements.

Women's Auxiliary Air Force Medical Orderlies.—Sir SAMUEL HOARE stated on May 1 that members of the Women's Auxiliary Air Force were employed only as sick-quarters attendants on members of that Force who were sick in quarters and not sent to hospital. Any skilled nursing necessary in such cases would be carried out by members of Princess Mary's Royal Air Force Nursing Service and trained members of voluntary aid detachments. Some members had been found since their enrolment to possess skilled qualifications. Whether any higher mustering could be accorded them was under consideration.

Rating of Voluntary Hospitals.—Dr. ELLIOT, answering Mr. De la Bère on May 2, said the Government would not introduce legislation forthwith to abolish rating in connexion with voluntary hospitals. The strong objections to a proposal of this kind were still valid. The circumstances of voluntary hospitals had altered

during the war, not always to their disadvantage. He was keeping the matter under close review.

N.H.I.: Claim for Increased Dental Fees.—In answer to Mr. Hicks on May 2, Dr. ELLIOT said a claim had been put forward by dentists for an increase of the scale of charges for the treatment of insured persons entitled to dental benefit under the National Health Insurance scheme. This claim was addressed to the Dental Benefit Council and was under consideration by it. As soon as the views of the council had been received the matter would have his attention and that of the Secretary for Scotland. Mr. RHYS DAVIES suggested that if this application succeeded the panel doctors would follow suit.

Weil's Disease.—Answering Colonel Heneage on May 2, Dr. ELLIOT said cases of Weil's disease occurred from time to time. The disease was not specially a feature of seaports. Its dangers had been referred to in recent reports by the Chief Medical Officer of the Department. Local authorities generally were aware of their powers and duties in connexion with rat destruction. He did not think it necessary to make special recommendations in this matter.

Cruise Visors for Protection against Eye Wounds.—A small number of Cruise visors for protection from eye wounds were sent to France for trial, but the reports received were inconclusive. It has been decided to make further trials with a larger number, and these are in course of preparation.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

There have been increases in the notifications of diphtheria, scarlet fever, and measles in England and Wales during the week—and the amount of advance has been appreciable in the case of measles. It is too early to say whether the customary biennial cycle is merely being postponed, as has happened in the large towns, or will be missed completely. While many counties are almost free from measles, others record numbers suggestive of epidemic proportions, notably: Chester 203 (Chester C.B. 58, Sale M.B. 27); Durham 274 (Darlington 103, Crook and Willington U.D. 41, Shildon U.D. 26); Lancaster 1,120 (Barrow-in-Furness C.B. 163, Blackburn 70, Blackpool 87, Preston 104, Oldham 83, St. Helens 76, Wigan 52); Leicester 84, of which 56 were in Leicester City; Surrey 115 (Chertsey U.D. 39, Esher U.D. 23); Sussex East 137, of which 111 were in Brighton; Yorks West Riding 624 (Huddersfield 184, Keighley 142); Monmouth 145 (Newport C.B. 66, Tredegar U.D. 48). On the other hand the numbers notified in the four largest cities continue to be low: London 29, Liverpool 32, Manchester 22, Birmingham 9. In Scotland measles also tends to be on the increase; the chief districts involved are Lanark county 48, Glasgow 29, Rutherglen 19 (both in Lanarkshire), Edinburgh 17, and Greenock (in Renfrewshire) 11.

The notifications of cerebrospinal fever continue to fall gradually in London and the great towns as well as in urban and rural areas; although there has been a steep fall in Scotland in the last six weeks appreciable numbers are still being notified in the large towns—for example, Glasgow 23, Edinburgh 7, Dundee 6. There has been a slight increase in Eire and Northern Ireland.

In the *Weekly Epidemiological Record* of the League of Nations the position as regards scarlet fever in both belligerent and non-belligerent countries in Europe is reviewed for the year 1939. In England and Wales the customary seasonal increase in the October to November period did not take place; notifications were actually below the lowest recorded in the immediately preceding eleven years. In France and Finland numbers were also low. In Germany (excluding Austria and the Sudeten area) scarlet fever during the summer of 1939 was above the maximum for the corresponding period of the previous eleven years, and during the months September, 1939, to March, 1940, remained above the median for these years. In the majority of non-belligerent countries (Sweden, Denmark, Holland, Switzerland, Hungary, Yugoslavia, Rumania, and Bulgaria) but little difference was recorded from the previous year.

No. 16

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended April 20, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940					1939 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	390	22	72	4	10	51	6	19	—	1
Deaths		7	4				—	—		
Diphtheria	712	23	231	52	39	825	86	161	33	19
Deaths	22	1	6	1	—	18	1	7	2	—
Dysentery	44	3	30		—	21	7	16		—
Deaths			—	—	—			1	—	—
Encephalitis lethargica, acute	6	—	1	—	—	5	—	—	1	—
Deaths		—	1				1	—		
Enteric (typhoid and paratyphoid) fever	30	1	10	2	1	16	3	8	6	1
Deaths	1	—	—	—	—	—	—	—	—	—
Erysipelas			48	4	4			67	7	8
Deaths		—	—				1	1		
Infective enteritis or diarrhoea under 2 years										
Deaths	26	6	6	5	6	33	9	10	5	6
Measles*	4,013	29	133		165		61	190		5
Deaths	5	—	1	2	2	5	—	1	4	—
Ophthalmia neonatorum	44	6	28	1	—	133	11	26	—	—
Deaths										
Pneumonia, influenzal†	815	46	12	6	8	1,270	118	14	4	15
Deaths (from influenza)	56	4	7	7	2	91	9	1	1	—
Pneumonia, primary			201	15				213	14	
Deaths‡		62		9	11		18		10	8
Polio-encephalitis, acute	1	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	4	—	1		—	8	2	1		—
Deaths		—	—				—	—		
Puerperal fever	—	—	7	1	1	—	—	11	1	—
Deaths		—					—			
Puerperal pyrexia	143	4	14		1	203	16	21		1
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	869	46	121	49	77	1,467	121	218	69	71
Deaths	1	—	—	—	1	3	—	1	—	1
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	567	10	27		16		459	451		32
Deaths	6	—	—	—	2	20	5	3	3	1
Deaths (0-1 year)	376	50	77	27	32	337	47	64	24	20
Infant mortality rate (per 1,000 live births)						52	40			
Deaths (excluding still-births)	5,124	872	716	208	167	4,874	891	697	214	148
Annual death rate (per 1,000 persons living)			13.8	13.9	14.7	12.0	11.3	14.1	14.4	13.0
Live births	6,504	963	973	367	252	7,122	1,140	974	348	321
Annual rate per 1,000 persons living			19.7	24.5	22.1	17.5	14.5	19.7	23.4	28.2
Stillbirths	294	42	45			250	36	34		
Rate per 1,000 total births (including stillborn)			44			34	31	34		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

Medical News

The annual session of the American Medical Association will be held this year in New York City from June 10 to 14 inclusive.

The National Safety First Association is holding a one-day congress in London on May 17, when an address will be given by Mr. A. W. Garrett, H.M. Chief Inspector of Factories. Among other papers will be one read by Mr. B. Ungerson of the National Institute of Industrial Psychology on "How to train New Employees in Safety."

The fifty-third Congress of the French Society of Ophthalmology will be held in Paris on May 24 and 25, when Professor Danis of Brussels will read a paper on the normal appearance and congenital abnormalities of the fundus. Further information may be obtained from the general secretary, Dr. Mérigot de Treigny, 1, Square de Latour-Maubourg, Paris, 7e.

The British Association is arranging a conference on science in its national and international aspects. The conference, which will be held at Reading from July 24 to 26, will take the place of the ordinary annual meeting, which would in normal circumstances have been held at Newcastle-upon-Tyne.

A conference on medical student education and wartime problems, arranged by the London Medical Committee of the National Union of Students, will be held at the University of Manchester on Saturday and Sunday, May 18 and 19, when discussions will take place as follows: May 18, 10 a.m., an ideal for medical education; 2 p.m., the pre-clinical student in wartime; 5 p.m., the clinical student in wartime. May 19, 10.30 a.m., the newly qualified doctor; 2 p.m., education in wartime.

The twelfth International Congress of Psychology, which was planned to take place at Edinburgh next July, has been postponed.

A difficulty is being experienced, it was stated at a meeting of the Scottish Civil Nursing Reserve Advisory Council, in obtaining nurses for emergency hospitals. For various reasons those who volunteered at the outbreak of war are not available, and the College of Nursing has to approach individually three or four times the number of nurses wanted before the requirements of hospitals can be met. Trained and assistant nurses and auxiliaries who have been trained are urgently needed for full-time service whenever and wherever required.

The Ministry of Health has issued a revised edition of Emergency Medical Services Memorandum No. 3 dealing with the procedure for keeping records and sending notifications on the admission, transfer, discharge, or death of casualties and Service or police sick who are treated in hospitals within the Emergency Hospital Scheme, either as in-patients or out-patients. The opportunity has been taken of amplifying the text, and this applies to the paragraphs, among others, on notification, particularly notification on Form E.M.S. 105. The memorandum contains a number of appendices and copies of all the relevant M.P.C. Forms and a revised version of E.M.S. 105. Copies of the memorandum can be obtained from H.M. Stationery Office (price 6d.).

The Department of Scientific and Industrial Research has just issued Volume 11, No. 3 (December, 1939), of the *Index to the Literature of Food Investigation*. This can be obtained from H.M. Stationery Office at the price of 4s. 6d. net.

The journal *Acta Rheumatologica* suspended publication with its issue dated December, 1939.

Dr. Laignel-Lavastine, professor of psychiatry in the Paris faculty and a well-known medical historian, has been elected president of the Société Médicale des Hôpitaux de Paris for 1940, in succession to Professor Pierre Lereboullet.

During the first eight months of 1939 Upstate New York reported 161 cases of poliomyelitis, with 87 in Erie County and 23 in Genesee County.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS.—All communications should be addressed to the Advertisement Manager (office hours, 9 a.m. to 5 p.m.). Orders for copies of the *Journal* and communications with reference to subscriptions should be addressed to the Secretary, B.M.A. House.

The TELEPHONE NUMBER of the British Medical Association and the *British Medical Journal* is EUSTON 2111.

The TELEGRAPHIC ADDRESSES are

EDITOR OF THE *BRITISH MEDICAL JOURNAL*, *Aitiology Westcent, London.*

SECRETARY, *Medisecra Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh;* telephone 24361 Edinburgh), and of the Office of the Cumann Doctúirí na h-Éireann (I.M.A. and B.M.A.), 95, Merrion Square, W., Dublin (telephone 62550 Dublin).

QUERIES AND ANSWERS

Nasty Taste and a Furred Tongue after Facial Hemiplegia

Dr. ROBERT S. RISK writes: I have under my care a patient who has recently had a mild left hemiplegia involving left facial muscles. Since that time he has had a thickly furred tongue and a persistent nauseating taste in his mouth which makes it impossible to swallow solid food, as it tastes rancid. I have tried every remedy I can think of without effect, and should be grateful for suggestions as to treatment.

Tests of Binocular Vision

The Chairman of a Medical Board writes: Mr. Bishop Harman's advice to Medical Boards regarding monocular and binocular vision (May 4, p. 755) would be excellent but for the fact that the sole equipment provided is an ophthalmoscope and a revolving test type. No lenses are supplied, and any request for them is treated with indifference; while as for coloured spectacles, Maddox rods, or prisms, any suggestion of such refinements would assuredly cause consternation at headquarters and an inquiry into the chairman's sanity. Therefore the only course to adopt in doubtful cases is reference to a specialist, with its inevitable consequences of delay, expense, and inconvenience.

Dr. PERCIVAL J. HAY (Sheffield) writes: I think Mr. Bishop Harman will agree on second thoughts that what is meant by "binocular vision" in the query raised by your correspondent is the combined vision of the two eyes (C.V.). This vision with both eyes open is often a line better than with each eye separately, and represents the candidate's real visual efficiency. The test, first introduced at the Sheffield school medical examinations, is now in use all over the country. It is unfortunate that the term "binocular vision" should have crept into the instructions for the Recruiting Medical Boards, since it is a term used for quite a different test in connexion with the ascertainment of whether the two eyes are working together or to what extent they are doing so.

Informing the Young

Dr. W. M. COPPARD (Dunmow) writes: Dr. L. B. (Hull) (May 4, p. 755) will find the following books useful: for the parents to read, *The Sex Education of Children*, by Bennett (Routledge); for the child to read, *How a Baby is Born*, by K. de Schweinitz. *New Babes for Old*, by W. de Kok, gives a detailed account of how a mother dealt with the questions of her little girl on this subject.

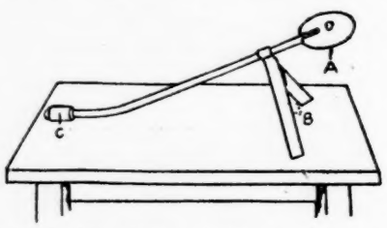
Dr. J. E. MACARTNEY (Gainsborough) writes: Application should be made to the British Social Hygiene Council, Tavistock House South, Tavistock Square, W.C.1, for the booklet *The Child and the Parent's Attitude to Sex* (price 2d.).

Reading without Arms

Mr. G. H. COLT, F.R.C.S. (London, W.1), writes: The late Professor Shipley of Christ's College, Cambridge, designed many such pieces of apparatus, but for the life of me I cannot remember where I read of them.

*** We published a note by Sir Arthur Shipley, under the heading of "A Page-turner for Armless Patients," in the *Journal* of June 9, 1917 (p. 769), and reprint it here:

One of the great difficulties with which men who have lost both hands have to contend is turning over the leaves of books. I have, with the aid of Captain C. G. M. Hatfield of the 18th Middlesex, and Mr. Barker of the Engineering Laboratory, devised a small instrument, one end of which is held between the teeth and the other—which is provided with an india-rubber



A. Compressed fibre pad; B, feet for raising A; C, india-rubber cap.

cap—is pressed against the leaf, and with a little practice the leaf can be readily turned over. The instrument is raised on two diverging feet so that one end is lifted off the level of the table and can be easily picked up by the mouth. The metal work is aluminium and the pad for the teeth is made of compressed fibre.

Income Tax

Change in Partnership

"M.D." puts the following query. A., B., and C. were in partnership, the firm's accounts being made up to September 30 each year. A. resigned in November, 1938, and D. became an assistant in the following month and a partner in April, 1939. How should D.'s personal liability be calculated for 1940–1?

*** (It is assumed that the firm is not claiming to be treated as starting a new practice.) The partnership assessment on B., C., and D. for 1940–1 will be determined by the excess of the gross earnings over the aggregate professional expenses for the year ended September 30, 1939. The expenses to be deducted will include D.'s salary as an assistant for four months and A.'s professional expenses for the period from October 1, 1938, to the date of his retirement. The simplest way of dividing the assessment between the partners seems to be for B. and C. to calculate their own shares—they will have a full year's expenses to deduct—leaving the balance to be regarded as representing D.'s share, but if that result is inequitable they might agree to apply their fractional share basis to the assessment. As our correspondent points out, D. should get the advantage of deducting more than six months' semi-personal expenses, but the income-tax assessment on the firm is not concerned; it is only the division between the partners that is in question.

Appointment—Residential Emoluments

"J. S." receives a salary of £350 and residential emoluments valued for superannuation purposes at £100 per annum. Is he liable to tax on the £100?

*** The answer depends on the terms of his appointment. If they provide that he shall receive £350 and the specified advantages he is liable on £350 only; on the other hand, if it specifies that the salary shall be £450 subject on payment to a deduction of £100 for those advantages he is liable on £450. The governing case is Maclean *v.* McLaughlin. A subscription to a defence society is allowable as a deduction if membership of the society is a condition of the appointment.

One Partner in the Forces

"B.'s" partner has joined the R.A.F., and during his absence his pay is being pooled with the practice receipts and the old partnership division is being maintained. The specialist work of the serving partner has, however, ceased. How should the tax liability be dealt with?

*** The partnership is still legally in operation by mutual consent, and the local assessment should continue to be made on the firm. The Service pay, however, will be separately assessed and should (for tax purposes) be excluded from the partnership receipts, and the fact that the serving partner bears the tax on his pay should, of course, be taken into account in dividing the tax on local assessment between the partners. As regards the specialist work, as this does not apparently amount to a separate practice no adjustment is due.

LETTERS, NOTES, ETC.

The Tavistock Clinic

At the annual luncheon of the Tavistock Clinic at the Grosvenor Hotel on May 6, Lord Alness, chairman of the council of management, who presided, said that the premises in Malet Street had had to be evacuated, but thanks to the hospitality of the University of London a new and real home had been found at Westfield College, where the work had been continued and even extended. The work among the children in particular remained a permanent feature of the Institute's activities. A falling revenue created further difficulties, and many fund-raising schemes had had to be jettisoned. On the credit side a legacy of £13,000 had been received under the will of an admirer of the clinic's work, and for the first time a general grant of £600 a year had been made by the Rockefeller Foundation. Sir Walter Monckton, in making an appeal for funds, said that the lessons of the last war, in so far as they related to psychological medicine, had been well learned. Already there were medical men in all branches of the Services who were dealing with the psychological problems which were likely to arise. This was a heavy task, because war brought stresses and strains of an exceptional kind. He felt that the Tavistock Clinic would be able to repeat in war the great service which it had performed in peace. There was every call to help the clinic in its work, a specially important part of which was to prevent children from growing up psychologically deformed. Colonel J. R. Rees, medical director of the clinic, said that in the first six months of the war the amount of work handled by the clinic was equal to three-fifths of that carried through in the six months preceding the war, and this despite the reduction of staff since the war began. In the children's department there were more applications than ever and the staff there was hard pressed. The reduction of staff on account of the number called up for war service was to be regretted, because the clinic had had the largest staff for an institution of its kind in the British Empire. He added that special courses in war neuroses had been started, and the University of London had recognized the clinic.

Answers in Tropical Hygiene

"EXAMINER" sends the following selection from answers to questions set at a recent examination in tropical hygiene which he feels are too good to keep to himself:

Cholera (mode of spread): "In burning the bodies of the victims there is often a minor explosion caused by the gases of the body, and these, as often as not, liberate millions of germs into the current circulation." Also, "Pilgrims lodge in a town, deposit the disease and their surplus dead and move on again, and so on, leaving behind them a trail of disease."

Plague: "Is caused by the *Bacillus bubonus*." Plague may invade a country by "rats swimming assure" from ships. In regard to prevention, "Infected rodents must not be allowed to disembark in the country." Again, "Every person from an infected ship should be sent to a wash-house where he can be thoroughly cleansed. Although the fleas are not so likely to be transmitted in his personal belongings, they should nevertheless be subjected to the closest scrutiny and immunized."

Sleeping sickness (cause): "Treponosomes breed in the blood of man and wild animals by the fusion of male and female bacteria in the red blood corpuscles."

Hookworm "infects the feet, the thin skin of the instep, hence the name 'Anklystomiasis.'"

"Guineaworm eggs in water hatch and become cyclops or water-fleas."

"To prevent surface contamination wells must be waterproof."

Rubella in a Young Infant

Dr. A. FREITAG (London, S.E.25) writes: An infant 8 weeks old was seen by me on April 22 with a typical rash of rubella and cervical adenitis. There was a history of contact with a case of rubella two to three weeks previously. In view of the fact that most medical textbooks mention the rarity of rubella in children under 12 months I thought that this case might be of some interest